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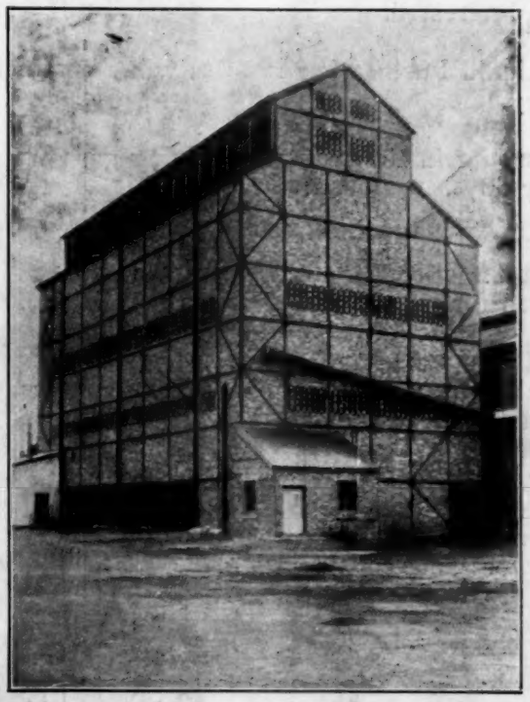

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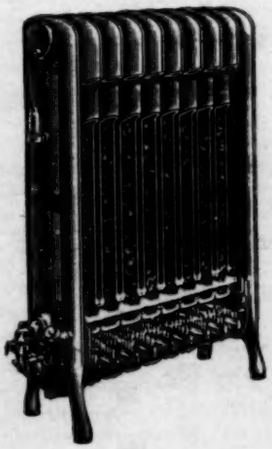

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American Gas Journal

SIXTY-THIRD YEAR

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WALTER A. FAIRSERVIS, Editor

Ismar Ginsberg, Associate Editor

Western Office, Peoples' Gas Building, Chicago, Ill.—Roy W. Brown, Manager
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Progress in Coal Utilization

By-Product Industry of Vital Importance

By RICHARD PRICE BUCKMASTER

The greatest weakness in the present system of coal utilization is due to waste. There are three elements which contribute largely to this condition, and they are: (a) The competitive manner in which coal is mined; (b) the unnecessary extent to which it is transported, and (c) the improper manner in which it is used. The first of these contributing causes results in a tremendous waste; the second promises a repetition of coal shortage at every coming period of sudden industrial expansion, while the third imposes an excessive burden of cost.

The most significant of these deficiencies in the utilization of coal is manifested in its consumption in the home. It is here that conditions are regarded as the most serious in times of stress. The solution of this problem is, therefore, one that concerns the individual directly and foremost. It is he who will be the gainer or the loser according to the extent to which he sees fit to interest himself in the means of effecting the progress, not merely needed, but absolutely essential, to the well-being of the immediate future. One of the answers to the solving of this problem lies in the development of artificial anthracite The accomplishment of this development depends merely upon the establishment of a process which will isolate the solid fuel portion of bituminous coal in the form of a substance equivalent to anthracite, and produce from the remainder a number of products whose value could be made more than sufficient to carry the expense of the operation.

In this regard nature has indicated the way of carrying out this operation to a successful conclusion. Originally natural anthracite was bituminous coal, but subsequently and under the stress of geological evolution it lost its volatile constituents and produced a product which can be used only for heating purposes. It was left for man to catch these by-product or waste values and turn them to his advantage A full realization of the vast values of these waste by-products of bituminous coal was not had until the outbreak of the European War. At that time there was little or nothing known in this country as to the value of these by-products. It was then that the situation became serious, and particularly was this true with regard to those industries that depended upon the by-products of coal-tar, that unpromising, black, sticky residue that is left over after the distillation of gas from soft coal.

At that time, 1914, it is said there were no plants in the United States equipped with apparatus for the distillation of coal-tar to meet the dyestuff crisis that then threatened the stability of the American textile and allied industries. It was realized that this condition was fraught with dangerous consequences, and for the purpose of avoiding them resolute and determined activities immediately followed, with the result that the number of plants equipped with the appropriate apparatus for the recovery of benzol, toluol, and related oils as the by-products of bituminous coal increased from thirty in 1915 to thirty-nine in 1916 and forty-seven in 1917, and the value of the outputs of these oils was $7,337,331, $30,001,081 and $28,655,-204 respectively. The number of active by-product ovens increased from 6,036 in 1915 to 6,607 in 1916 and to 7,298 in 1917; and the output of by-product coke in 1917 exceeded that of 1915 by 59 per cent.

The shortage of coal-tar dyes which faced the country after the cessation of those imports from Germany in 1915 was in some measure overcome by the growth of the domestic dye industry in 1916, which period must be regarded as the greatest development in connection with this new industry. During those twelve months, the domestic production gained an impetus which carried it successfully to a status which must be regarded as truly remarkable. In the census issued by the Department of Commerce in October, 1916, it was shown that there were thirty-six firms in America manufacturing coal-tar dyes, forty firms manufacturing intermediates, eighteen firms producing crudes. and fifteen firms manufacturing vegetable dyestuffs.

But in spite of the abundant raw materials for dye making afforded by the by-product coke ovens of this country, the situation was not made secure until the German-owned patents covering the manufacturing processes of dyestuffs were released after the passage of the trading with the enemy act on October 6, 1917. In this year there was established a new record in the production of bituminous and anthracite coal. During that period there were 551,791,000 net tons of bituminous coal produced, and 99,612,000 net tons of anthracite coal produced. The increase of bituminous coal over 1916 was 49,271,000 net tons, or 9.8 per cent, and in anthracite it was 12,033,000 net tons, or 13.7 per cent.

Progress of Bituminous Coal Industry

It is a noticeable fact that the progress of the bituminous coal industry increased from a production of 100,000,000 net tons in 1890 to 551,791,000 in 1921, while the development of the anthracite industry has in no way kept pace with that of the bituminous coal. In twenty-eight years the production of anthracite

has slightly more than doubled, while that of the bituminous has increased more than fourfold. The years from 1914 to 1917 show the greatest increase in the production of bituminous coal, which was more than 100,000,000 net tons during that period.

This remarkable increase was due to the fact that the war was then in progress, and coal as then used filled three distinct and unrelated functions. During that period it furnished industrial power, material for the manufacture of coal products, and domestic heat. In normal times about two-thirds of the coal consumed in the United States goes to the production of power which is divided almost equally between the industries and the transportation system: about one-sixth is used as raw material for making substances employed industrially, such as metallurgical coke, gas, nitrogen compounds, benzol, tar and coal-tar products. One-sixth approximately is employed for the heating of homes and other buildings. It will be observed, then, that the combined industrial requirements outweigh the needs of the home five to one, and yet it is the coal conservation and prevention of waste in the latter utilization that demands immediate remedial action.

Anthracite, characteristic of every luxury from the standpoint of producing heat combines refinements of quality with limitations of supply. Its cost of production is approximately twice that of bituminous coal, and it has no capability toward yielding by-products to modify its cost. It may therefore be dismissed as not equal, or adapted, to the task of supplying the industrial needs of a nation and of a people. However, a big fraction of the available supply of anthracite coal is already exhausted.

We must, therefore, no matter what may be our wish in the premises, turn to bituminous coal and its by-products which are so essential to our industrial well-being. There is no alternative. This condition has already taken place to a partial extent; war conditions accelerated the change; and the indications are that the future will demand it more completely. The advantages of bituminous coal are well known—its relative cheapness, its wide range of distribution, its ample reserve, for less than 1 per cent of its supply in this country has thus far been used, and the future possibility of improved utilization. All these advantages greatly outweigh the objection to its use, which is because of its dirtiness. This objection can, however, be overcome as it so happens that the smoke from soft coal represents its most concentrated value. If there can be extracted this valuable substance and use it toward reducing the cost of fuel, at the same time making a smokeless product for heating use, the sole objection will be turned into an advantage, and the domestic fuel problem will then have been solved.

The Latent Values

In 1915, before the price of coal was enhanced by war conditions, the average value of bituminous coal at the mine was $1.13 a ton. By way of contrast we may tabulate the latent values contained in this quantity of raw coal, giving the figures in round numbers and basing the calculations on prices prevailing in 1915. We have seen that one ton of bituminous coal cost $1.13 at the mine. Now let us see the quantity value at point of production: One thousand five hundred pounds of smokeless fuel of the value of $5 (this figure is based upon the approximate selling price of anthracite), 10,000 cu. ft. of gas at 90 cents per thousand feet, $9; 22 lb. of ammonium sulphate at 2.8 cents per pound, 61 cents; 9 gal. of tar at 2.6 cents per gallon, 23 cents, and 2½ gal. of benzol at 30 cents per gallon, 75 cents, making a total of $15.59 for one ton of bituminous coal. It must also be borne in mind that these figures would be much higher if an adequate coal products industry were in existence at the time this analysis was made in 1915, which would be the case if the same examination were made to-day.

It is therefore clearly obvious that there should be a way for the home to get its fuel more cheaply than it has, when a ton of coal worth little more than $1 at the mine contains about $15 worth of commodities that are essential to a continuation of our industrial and human welfare. This problem has already received the careful consideration of scientific minds, and it has been decided that the answer lies in the development of artificial anthracite. However, the solving of this problem, in reality, is rather one of economics than of technology.

With this problem still in our minds we very naturally turn first to the coke industry, for here the greatest progress in coal utilization has been attained. The by-product coke oven receives raw bituminous coal, and subjects it to destructive distillation. The process consumes none of the coal, but breaks it up into five components—coke, gas, ammonia, benzol and tar—of which coke is the main product, while the other four are called by-products. Where the by-products are wholly recovered, no part of the coal is wasted. In round numbers, one ton of bituminous coal yields 1,440 lb. of coke, 10,000 cu. ft. of gas, 22 lb. of ammonium sulphate, which is the solid form in which much of the ammonia is recovered, 2½ gal. of crude benzol, and 9 gal. of tar. In this immediate condition half of the gas is available for use as fuel or in lighting; the ammonium sulphate is a valuable fertilizer; benzol is an excellent motor fuel, a substitute for gasoline, and the tar may be used as a waterproofing material for making roofing and for dressing roads.

It must be realized that these four first products have an unlimited field of usefulness as such. In addition, three of them represent raw materials upon which the important field our present industrial development and our national safety and welfare are dependent, and upon which, if bountifully supplied, new industrial activities of far-reaching consequences can be reared. The ammonia, recovered as such, instead of in the form of ammonium sulphate, forms the basis of modern refrigeration and is used for making explosives and chemicals. Benzol is a mixture of substances, including the deadly trinitrotoluol (TNT), which can be made to yield explosives, dyes, drugs, medicines, solvents, photographic developers, and other chemicals of a large variety and wide range. Tar, likewise, yields a 10 per cent fraction which may be turned into explosives, disinfectants, dyes, drugs and other valuable products. Benzol and tar, in short, are the basis of the coal-tar industry, an industry which is as yet inadequately developed in America, but an industry which Germany guarded with a jealous eye, and which she has intensively cultivated

to an amazing advantage which was so well demonstrated in the late war.

It was during those trying and anxious years that the consequences of inadequate coal products development in the United States became serious, and in some respects critical. During that same period the anxiety and death that resulted because of our failure properly to develop this vastly important industry fell the entire responsibility for the shortage then experienced in explosives of certain types, as well as of dyestuffs, and a variety of extremely essential drugs and chemicals, which caused an untold loss of lives at home and abroad, coupled with an enormous financial loss by domestic industrial enterprises.

There may also very properly be added to this list of deeply regrettable experiences a partial responsibility for the high cost and inadequate supply of nitrogen compounds and gasoline. These considerations, which by no means represent all of them, are apart from wasted materials and wasted opportunities which ought to have been taken advantage of long before the world became involved in the greatest and most destructive struggle known to civilization.

The coal products situation, the great possibilities of the by-products of coal tar, represent one of the most complex, subtle, and withal the most important problems in the entire field of industry in the United States to-day, and this is true not only in respect to the conditions which now confront the American people, and which demand a solving, but also as regards the trend of future industrial growth to so vast an extent that it is quite difficult to visualize its full scope. The failure of the United States to sense the vast importance of the development of this industry prior to 1914 came desperately near causing the map of the entire world to be markedly changed. And this failure is in part responsible for some of our present embarrassments which will in nowise be ameliorated unless some effort is made to remedy the situation which, if further neglected, will result in an unfortunate disadvantage in the future. It seems remarkable that a single partly developed unit of industry can have such a vital effect and far-reaching bearing on the well-being of the entire nation, but such is unequivocally true of the products of soft coal. That fact cannot be expressed too plainly, or in terms too strong.

There is another angle to this question which is of immediate concern, and that is the continued supply of motor fuel. This condition, it is maintained by those who are in a position to speak authoritatively on the subject, is due to the remarkable rapidity with which the supply of petroleum in this country is vanishing. We, therefore, very naturally turn and examine the commercial possibilities of the by-products of coal for the purpose of supplying this anticipated deficit.

A development which is of the greatest importance, with the most telling consequences to our industrial welfare, is that of the proper utilization of coal. It is asserted, and with some show of justification, that bituminous coal mining as an industry is beset by conditions that are in a large degree responsible for wastefulness, which would seem to justify apprehension for the future. Co-ordinated utilization of coal is therefore the solution of the problem. And a commercially successful solution of this problem would seem to point to the development of the oil shale, or bituminous shale, of which there is a large, and as yet wholly undeveloped, supply in the United States.

Oil Shale

In about 1852 Scotland first produced oil shale on a commercial basis. Since that time it has become an established industry in that country, the output of shale increasing gradually from 2,350 long tons in 1871 to 3,117,658 long tons in 1917. The distillation of bituminous shale has been a commercial industry in France for a considerable period, although the amount of oil produced has been much less than that produced in Scotland. And yet, notwithstanding the fact that oil has not yet been obtained on a commercial scale from shale in this country, the oil products are nevertheless closely related to those obtained from petroleum. Even though the production of crude petroleum in the United States has shown an appreciable gain each year, this gain has not been as large as the growth of the demand for petroleum products. And again, because of the large increase in the number of automobiles, trucks, tractors, and other like vehicles in this country, exclusive of locomotives and seagoing vessels, that demand for gasoline and motor fuel has become so great that the present domestic output of crude oil is not by any means sufficient to satisfy the demand for gasoline and motor fuel of high volatility.

We distinctly recall that during and after the war there was a marked increase in the demand for petroleum and its products which far exceeded the output. It is estimated by the United States Geological Survey that the curve of crude oil production will reach its peak within a few years, and then the United States will have to look to other sources for hydrocarbon oils. It is claimed that should this condition arise that the deficit may be supplied by foreign oil fields for a time. And if the foreign oils cannot be obtained in sufficient quantities and at reasonable prices, we can turn to our oil shales for our supply of hydrocarbon oils when economic conditions for their development become possible.

While it is true that our oil shales constitute a tremendous potential reserve, and that oil can be obtained from these shales, it is claimed that it has not yet been determined in actual commercial practice whether these oils can be produced with profit under the conditions that obtain in the United States to-day.

If we will permit our minds to hark back to 1914, and to the years that preceded August of that year, we will be compelled to admit, even though we will acknowledge the admission with reluctance, that it was asserted and maintained with all the apparent warmth of a true patriot that the development of a coal-tar industry in this country could not be carried on successfully as viewed from a commercial standpoint. Scotland is to-day operating oil-shale plants on a commercially successful basis, while we have none in this country. And this condition in the face of the fact that the shale deposits in the United States are richer in recoverable oil than the Scotch shales that are now being worked successfully in that country, and it is very probable that our shale deposits nearly equal those of Scotland in nitrogen content, which is a measure of recoverable ammonia. Added

to this is the fact that the great quantities of American shales are of greater thickness and better suited for mining than Scotch shales.

It would therefore seem clearly to be the duty of this country to direct its energies to the development of our oil-shale deposits, for it is maintained, and with a great deal of justification, that the United States cannot continue long to depend on domestic petroleum production to supply completely the demand for petroleum products, and that sooner or later our oil shales will have to be used to help supply the deficit.

In 1914 this same condition confronted the people of the United States with regard to our neglect to develop the dye industry, and we learned our lesson, but at a tremendous cost. Are we going to so soon forget that lesson?

By-Product Coke Production in 1921 Less by 28 Per Cent than in 1920

The output of by-product coke continued to increase slowly in December, but was still 28 per cent below the 1920 average. The total production was in round numbers 1,860,000 net tons, an increase over November of 94,000 tons, or 5.3 per cent. Part of the increase was attributable to the fact that December is a thirty-one-day month and November a thirty-day month. In terms of average daily output, the increase was but 2.2 per cent. The ratio of production to capacity averaged 51.8 per cent, as against 85 or even 90 per cent when the demand for coke is most active. Fifty-nine plants were producing and twelve plants were idle throughout the month.

These statistics are based upon reports from sixty-nine of the seventy-one plants in existence, and include an estimate for the two plants not reporting.

The production of beehive coke also increased slightly, a total of 514,000 tons being reported. The depression at beehive ovens thus remained more serious than at by-product ovens; the former are producing at but 30 per cent of the 1920 rate, while the latter have now attained 72.4 per cent. The total production of both kinds of coke was 2,374,000 tons, little more than half of that in 1920.

Monthly Output of By-product and Beehive Coke in the United States* (Net Tons)

	By-product Coke	Beehive Coke	Total
1917 monthly average	1,870,000	2,764,000	4,634,000
1918 monthly average	2,166,000	2,540,000	4,706,000
1919 monthly average	2,095,000	1,587,000	3,682,000
1920 monthly average	2,569,000	1,709,000	4,278,000
September, 1921	1,423,000	289,000	1,712,000
October, 1921	1,734,000	416,000	2,150,000
November, 1921	1,766,000	477,000	2,243,000
December, 1921	1,860,000	514,000	2,374,000

*Excludes screenings and breeze.

The quantity of coal required to manufacture the coke produced is estimated at 3,483,000 tons, of which 2,672,000 tons were consumed in by-product ovens and 811,000 tons—less than a fourth—in beehive ovens. The coke industry is thus consuming coal at a rate of 2,866,000 tons a month less than prevailed in 1920.

Estimated Monthly Consumption of Coal for Manufacture of Coke (Net Tons)

	By-product Coke	Beehive Coke	Total
1917 monthly average	2,625,000	4,354,000	6,979,000
1918 monthly average	3,072,000	4,014,000	8,086,000
1919 monthly average	2,988,000	2,478,000	5,466,000
1920 monthly average	3,684,000	2,665,000	6,349,000
September, 1921	2,044,000*	456,000*	2,500,000
October, 1921	2,491,000*	656,000*	3,147,000
November, 1921	2,538,000*	752,000*	3,290,000
December, 1921	2,672,000*	811,000*	3,483,000

*Assuming a yield in merchantable coke of 69.6 per cent of the coal charged in by-product ovens, and 63.4 per cent in beehive ovens.

Gas a Predominant Factor in Underground Oil Recovery

While diplomats bicker and bluster over the control of remote corners of the world supposed to contain deposits of that precious fluid petroleum, large quantities of oil, perhaps as much as 60 or 80 per cent of the original reservoirs, are left underground in the United States when wells are abandoned because no means have been determined whereby it is possible to recover more than a small percentage of the oil, according to A. W. Ambrose, chief petroleum technologist of the Bureau of Mines. This failure to effect a greater recovery of the underground oil is due to the exhaustion of the subterranean gas flow, says Mr. Ambrose.

The manner in which gas serves as an expulsive medium was recently shown by an experiment at the petroleum experiment station of the Bureau of Mines. A steel container about 3 ft. long and 3 in. in diameter was filled with sand which was then thoroughly saturated with oil. The amount of oil introduced was known by weight and measurement. After the sand had been saturated, gas was forced into the container under a pressure of 200 lb. to the square inch. Then a valve at one end was opened and the gas allowed to escape, bringing with it perhaps 18 per cent of the oil put into the container.

In other experiments the amount of oil recovered varied from 15 to 25 per cent, depending on the pressure and other conditions. After the gas had forced out 18 per cent of the oil the container was held in a vertical position for the purpose of determining how much oil would drain out, but the capillary force exerted on the oil was so great that only a negligible quantity of oil drained from the sand.

"This simple experiment emphasized the fact that gas is the predominant factor in moving oil to the well and that when the gas is gone the production is gone," declared Mr. Ambrose. "In any event, it is unquestionable that large quantities of oil are left underground, and, whether the figure is 60 per cent or 80 per cent, it is too large. In certain part of the Appalachian fields, the practice of forcing compressed air or gas into a central well, from where it goes to adjoining wells and carries the oil with it, has caused wells to produce as much oil as they had up to the point when considered ready for abandonment. There are undoubtedly other means of effecting a greater recovery and these questions should be studied and applied before the wells are abandoned."

Low-Temperature Distillation of Amalgams* of Bituminous Non-coking Coal and Asphaltic Oils

By JOSEPH D. DAVIS, Assistant Supervising Chemist, Pittsburgh Experiment Station, Bureau of Mines, and C. E. COLEMAN, Junior Chemist, Pittsburgh Experiment Station, Bureau of Mines

During some distillation experiments conducted by the Bureau of Mines in co-operation with the Trent Process Corporation it was observed that amalgams of heavy petroleum oils and finely pulverized coal tended to produce a denser coke than that obtainable from the coal when retorted alone. Even anthracite coal when retorted with oil yielded a coke. This led the writers to believe that by mixing a low-rank coal (sub-bituminous or even lignite) with asphaltic oil and retorting it, a coke suitable for domestic fuel could be made. Thus there was contemplated the production of domestic coke and the utilization of a low-grade oil in one operation.

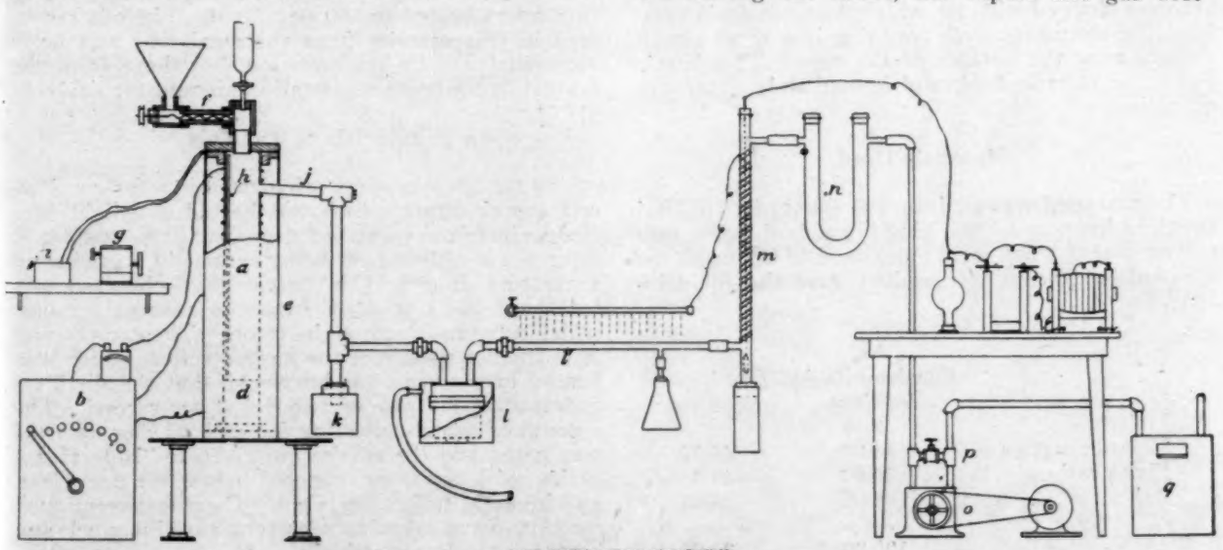
In order to decide on the practicability of this process, it was necessary to know the value of products obtainable by such a method, as compared with those obtained by separate distillation. A laboratory method was therefore devised and, while it was realized that no small-scale testing apparatus for destructive distillation gives results that are directly applicable to commercial-scale operations, by keeping distillation conditions uniform for comparative tests results were obtained valuable for purposes of comparison. The plan was to distill mixtures of coal and oil in a laboratory retort, and then distill the constituents separately under the same conditions. The comparative quantities of products yielded were thus directly obtained, and their quality was determined by analysis. The following are the main points investigated: (1) Quantity and quality of coke, (2) quantity of oils boiling below 221 deg. Cent. (gasoline stock) and oils boiling at 221 to 300 deg. Cent. (kerosene stock), and (3) quantity and quality of gases.

*The term "amalgam" is used in its broadest sense to designate an intimate mixture of materials; in this case, approximately seventy parts finely pulverized coal and thirty parts oil.

Apparatus

The accompanying figure shows the apparatus used. It consisted of an iron retort (a) made of extra heavy six-inch pipe wound with nichrome wire for electric heating, and a suitable train for condensing tar vapors and scrubbing and measuring the gases. The retort windings were so spaced as to give the strongest heating at the top and bottom of the retort, in order to compensate for excessive radiation of heat from the exposed cast-iron caps. A sheet-iron casing (e) held the heat insulating material, which consisted of infusorial earth loosely packed. Temperatures were measured with a Hoskins base-metal thermocouple connected to a Leeds and Northrup portable potentiometer (i). Previous to making any test runs, the heating characteristics of the empty retort were determined by heating at a slow rate to 600 deg. Cent., the maximum distillation temperature decided upon, and finding the zone of uniform temperature by exploration with the thermocouple. Such a zone, wherein the temperature variation was not more than 30 deg., was found, and in subsequent tests the charges were kept within its limits. A low-tension regulating transformer (b) with a voltage range of two to forty-two volts served to facilitate adjustment of the heating current.

On leaving the retort, the vapors and gas first



COAL DISTILLATION APPARATUS
Fig. 1

passed over a tar well (k) which retained most of the heavy tars, and then through two water-cooled glass condensers (l) and (l'). The tar mist remaining in the gas was thrown down by a Cottrell precipitator (m), after which light oil vapors were absorbed by passage through a U tube (N) containing activated charcoal. A motor-driven rotary pump (o) with an adjusting by-pass (p) served to keep the pressure in the system constant, and a ten-light dry meter registered the volume of the gas. Grab samples of the gas were taken at a point in the train just past the charcoal scrubber (l), a T tube with a capillary branch being inserted in the train for this purpose. The total gas yield for each run was collected in a 250 cu. ft. gas holder (g).

The precipitator consisted of a 1¼-in. glass tube one meter long, wound spirally on the outside with aluminum foil ribbon one-half inch wide which was grounded electrically to the water supply pipe. Inside of the tube a No. 22 copper wire was suspended centrally from a heavy wire which passed through a one-hole rubber stopper at the top of the tube. This wire served as the positive electrode of the precipitator, and was held taut by a heavy lead weight attached to its lower end. Direct current at 20,000 volts pressure was passed through the precipitator tube from a 200:1 step-up transformer with a keneton rectifier in series on the high-tension side. One electrode of the rectifier was connected to the central wire of the precipitator and the other electrode was grounded. This arrangement caused an unidirectional corona discharge to pass between the electrodes of the precipitator.

The precipitator just described proved efficient in throwing down tar mists, provided that the gas flow did not exceed 0.1 cu. ft. per minute. For a more rapid flow, a tube two inches in diameter was used, and the gas was passed through a filter chamber containing cotton waste before it entered the precipitator tube. The filter removed a large portion of the tar carried by the gas, leaving only a small part of the work for the precipitator.

The Cottrell apparatus is well adapted to the completed removal of small quantities of tar mist from gases, but its capacity is small. If overloaded, it soon becomes clogged with tar which does not drain away from the electrodes well, resulting in a short circuit, usually near the bottom of the tube. This breaks down the electric field, and immediately stops precipitation.

Materials Used

The coal used was a mixture of equal parts of Utah standard lump and Utah king lump, both being non-coking coals. They were pulverized to 200 mesh and a sample of the mixed product gave the following analysis:

	As Received Basis Per Cent	Dry Basis Per Cent
Moisture	3.43	
Volatile matter	44.92	46.52
Fixed carbon	45.62	47.24
Ash	6.03	6.24
	100.00	100.00

The oil used was Casmalia crude oil, obtained from Santa Maria, Cal. It contained approximately 9 per cent water, and when dehydrated showed a specific gravity of 1.001 at 15 deg. Cent. It was a very viscous asphaltic oil and left a residue of approximately 15 per cent on distillation to dryness.

Test Procedure—Preparation of the Amalgam

Twelve kilograms of the coal was weighed into a twenty-gallon stoneware churn, and about twelve liters of hot water added. After churning the mixture for ten minutes, whereby the coal was thoroughly wetted, 5.1 kilograms of oil were added. The mixture was now churned until the coal and oil agglomerated into little balls the size of a pea. The water was drained from the resulting amalgam, which was squeezed to remove enclosed water and allowed to air-dry for several days before retorting.

Duplicate distillation runs were made with charges of oil, coal, and a mixture of the two. The charges, approximately five kilograms in each case, were placed in the cold retort, and gradually heated to a temperature of 600 deg. Cent. The heating current was then regulated so as to maintain the temperature constant at this point until gas ceased to be evolved, when the test was considered finished. Coal and amalgam were charged directly into the retort by the feeder (f), but it was necessary to use a welded sheet-iron container for the oil to prevent it from seeping through the clay baffle into the cold retort bottom and outside the constant temperature zone.

At the end of each test, the coke was carefully removed from the retort and weighed; likewise the tars. In order to get the total tar yield, it was found necessary to weigh all parts of the condensing apparatus before and after each experiment. Light oils absorbed in the charcoal scrubber were removed by distillation of the charcoal with superheated steam in a retort heated to 400 deg. Cent. The oils recovered in this manner from the amalgams and coals were analyzed by fractionation, but those from the oil distillation were too small in amount for analysis.

Anaylsis of Tar Oils

The tar oils were first dehydrated in a 600-c.c. Barrett copper retort, which was heated overnight in a Freas electric oven at 150 deg. Cent., the water and light oils distilling over being caught in a graduated separatory funnel. The water thus collected was measured and drawn off from the supernatant oils, which were returned to the retort. The dry tar was now fractionated from the copper retort, which was heated over a ring gas burner so that the distillate collected at the rate of two drops per second. The amount of liquid collecting for each 25 deg. interval was noted and the results are given in Table II, together with fractions collected below 221 deg. Cent. and from 221 to 300 deg. Cent. These last-mentioned fractions were taken to represent gasoline stock and kerosene stock respectively.

Table I—Yield of Distillation Products (Per Cent of Charge)

Charge	Maximum Distillation Temperature Deg. Cent.	Water %	Tar Sp. Gr.	Tar %	Gas %	Gas Sp. Gr.	Gas B.t.u.	Light Oil from Gas %	Residue %	Distillation Loss %
Amalgam	600	14.0	14.2	1,038	17.0	0.5561	820	8.1	40.1	6.6
Charge	600	7.0	69.3	0.928	4.5	0.6185	966	4.0	15.2	...
Coal	600	10.6	11.5	1.015	10.1	0.5816	726	3.2	60.3	4.3

Yields Per Ton of Amalgam

Charge	Tar Gal.	Oils Boiling 0-221° Cent. Gal.	Oils Boiling 221-300° Cent. Gal.	Gas Cu. Ft.	Coke Lb.	Heating Value of Gas Per Cu. Ft.	Heating Value of Gas Per Ton
Amalgam	32.8	9.9	8.1	7,450	802	820	6,109,000
Oil (670 lb.)	60.9	9.0	17.3	668	103	966	645,288
Coal (1,110 lb.)	15.2	4.1	4.1	2,500	660	726	1,815,000
Sum of oil and coal when distilled separately	76.1	13.1	21.4	3,168	763	777	2,460,288

Gas

A number of gas samples were taken at corresponding intervals during each test run and analyzed in the Bureau of Mines gas laboratory. These analyses were averaged, and results are given in Table III, together with heating values calculated from the analysis in each case.

Results Obtained

The results just described show that the amalgam yields more than twice as much gas as its constituents distilled separately, and less than half as much tar oil. The amalgam gas is richer than the combined gases from coal and oil by 43 B.t.u. per cubic foot, so that the total heating value in the gas from one ton of amalgam is 2.5 times that in the combined gases from the coal and oil. Eighteen per cent more solid residue was obtained from the amalgam than from its constituents and, while it was not as dense and firm as by-product coke, it was far superior to the residue obtained from the coal. The latter was only loosely caked together, and could easily be crushed in the hand. The light oil scrubbed from the amalgam gas amounted to 4.4 gal. per ton of charge, and that from the constituents was 0.9 gal. per ton of charge. The oil from the amalgam gas was lighter than that from the coal gas; 42 per cent of the former boiled under 100 deg. Cent. as compared with 22.6 per cent for the latter. There was not sufficient oil obtained from the gas of the oil distillation for analysis.

The main effect of mixing oil and coal previous to

Table II—Tar Fractionation Analysis (Per Cent Volume)

	First Drop ° C.	0-150°	150°-200°	200°-225°	225°-250°	250°-275°	275°-300°	0-221°	221°-300°	Residue	Water	Remarks
Amalgam No. 1	125	2.3	6.7	5.0	8.4	12.6	13.8	12.2	35.6	52.2	50.0	240 c.c. sample—245.0 gm.
Amalgam No. 2	135	...	4.6	5.8	9.2	10.4	14.6					240 c.c. sample—
		2.3	5.6	5.4	8.8	11.5	14.2					247.0 gm.
Oil No. 1	90	3.2	6.8	4.8	7.2	6.4	16.4	14.8	28.4	56.8	9.3	250 c.c. sample—235.5 gm.
Oil No. 2	80	4.4	8.0	4.0	6.4	7.6	11.2					250 c.c. sample—
		3.8	7.4	4.4	6.8	7.0	13.8					236.5 gm.
Coal No. 1	95	2.0	9.3	7.7	8.3	8.0	10.3	18.0	27.0	55.0	52.5	300 c.c. sample—297.0 gm.
Coal No. 2	110	2.8	8.4	8.4	7.6	9.6	8.0					250 c.c. sample—
		2.4	8.8	8.0	7.9	8.8	9.1					249.5 gm.

Fractionation of Oil Scrubbed from Gas

	Amalgam	Coal
Specific gravity	0.833	.....
First drop	55° C.	85° C.
0- 75°	6.5%	.....
-100°	42.0%	22.6%
-125°	23.4%	32.7%
-150°	10.3%	26.6%
-175°	5.8%	.....
Residue	7.0%	18.1%

Table III—Average Analysis of Gases

	Amalgam	Coal	Oil
Carbon dioxide (CO_2) per cent	5.1	8.0	7.3
Unsaturated hydrocarbons (C_2H_4, cc.), per cent	8.0	4.0	5.0
Oxygen (6_2), per cent	0.5	0.2	0.2
Hydrogen (H_2), per cent	30.2	28.1	20.6
Carbon monoxide (CO), per cent	6.1	9.2	0.8
Methane (CH_4), per cent	46.6	45.6	51.1
Ethane (C_2H_6), per cent	2.9	4.6	15.0
Nitrogen (N_2), per cent	0.6	0.3	...
Calculated heating value, B.t.u. per cubic foot	820	726	966

distillation under the conditions prevailing for these tests is to increase greatly the gas yield at the expense of the tar. The increase in gas doubtless comes from the oil. At least a part of the oil in an amalgam must be regarded as absorbed oil, and under those conditions it would have an abnormally low vapor pressure, which would tend to hold it in contact with the coal at temperatures far above its normal boiling point. This would promote cracking or breaking up into simpler hydrocarbons. In this case, very light liquids and gaseous hydrocarbons were produced.

It is conceivable that the severity of the cracking reactions could be modified by distillation under reduced pressure, so that a high yield of light liquids at the expense of the gas might be obtained. Reduced pressure would certainly increase the yield of liquid products from that part of the oil not absorbed by the coal.

Conclusion

Amalgams of a bituminous non-coking coal and a heavy asphaltic oil were distilled to a temperature of 600 deg. Cent., and the products were collected and examined. The method consisted of charging the material into a cold retort, slowly heating to 600 deg. Cent., and holding the temperature at this point until gas ceased to be evolved. Following distillation of amalgam, samples of the coal and oil used were distilled separately under the same conditions as those prevailing for the amalgam, the products in each case being collected and examined as before. On comparing the distillation products from the amalgam with the combined products for equivalent quantities of coal and oil distilled separately, the following conclusions were reached: Under the distillation conditions prevailing, (1) the amalgam yields only about half as much tar oils as its constituents; (2) a lower yield of gasoline and kerosene stock is obtained for the amalgam, 9.9 and 8.1 gal. respectively per ton, as compared with 13.1 gal. and 21.4 gal. from the coal and oil; (3) the residues obtained from the oil and coal were not coked, whereas that obtained from the amalgam was a coke of fair quality. The residue from the amalgam was 18 per cent greater than the combined residue from coal and oil; (4) the amalgam yields over twice as much gas as the coal and oil distilled separately, and its heating value is 5 per cent higher. The total heating value of gases from one ton of amalgam was 6,109,000 B.t.u. against 2,460,288 B.t.u. for the combined gases from coal and oil.

Company Establishes Service Annuities

In order to provide financial assistance for employees who, because of age or disability, are unable to continue in active work, and whose service with the company justifies its help, the Georgia Railway & Power Company, owner of the Atlanta Gas Light Company and other public utilities of that city, has just announced a plan for service annuities, the plan being effective from Jan. 1, 1922.

It is divided into four classes as to beneficiaries, as follows:

Class A includes those employees continuously in the service of the company for thirty years or more who have reached the age of sixty. Men of this class are to be automatically placed on the retired list, and will receive annually a sum equal to 30 per cent of their earnings for the twelvemonth period just previous to retirement.

The Class B clause provides that employees in service continuously for twenty-five years upon reaching the age of sixty shall be retired and receive a yearly stipend equivalent to 27½ per cent of their earnings for the twelvemonth period previous to retirement. For twenty years' service Class C provides a 25 per cent stipend.

Class D provides that any employee in the service of the company for fifteen years who becomes totally disabled for any reason other than self-inflicted, or by injury arising in the course of employment, shall be retired and receive from the company a sum equal to 25 per cent of his earnings for the twelvemonth period preceding retirement.

No Gas Shortage Anticipated in Pittsburgh

Alfred Hurburt, vice-president and general manager of the Equitable Gas Company, of Pittsburgh, Pa., lately made the following statement:

"Many inquiries have been received dudring the last few days as to the ability of the gas companies to take care of the needs of domestic consumers during the threatened cold wave. It is gratifying to state that as a result of the co-operation of their consumers in eliminating the waste of this precious fuel, there will be ample gas to take care of all needs of domestic and industrial consumers.

"The gas companies of Pittsburgh during the last five or six months have been urging their patrons to cooperate with them in the elimination of waste of gas and to provide against maximum winter demands by installing coal or some other fuel for main house heating. The people of Pittsburgh and vicinity have endeavored to meet this situation by installing efficient gas-consuming appliances, with the result that it now looks probable that there will be sufficient gas for domestic and industrial consumption during the remainder of the winter. Very little gas is now being sold to industries because of the business depression, so that there is ample to take care of all.

Industrial Conditions as Indicated by the Utility Load

The Interdependence of Business and Utility

By HOWARD A. DILL

We have weather reports, crop reports, stocks and bonds reports, export and import reports, iron and steel reports, and other reports ad infinitum. Many of these serve as barometers of business conditions, but who ever heard of utility reports to indicate the trend of business? And yet the output or revenues of utilities must necessarily be influenced by the ups and downs of industry as a whole. In these days of close relationship of business, nationally and internationally, prosperity or depression affects all lines of business more or less. The experiences of the past few years have brought out that fact very noticeably. Russia may be thousands of miles away, but the conditions of its people and its business have an influence on the people of this country. Before the World War, a famine or a business depression in a particular country would have little effect throughout the world, but a cataclysm like that from 1914 to 1918 reacts upon all civilized people, and until the stricken nations are put on a productive and consumptive basis, a business stagnancy will exist.

What has this to do with utilities? No utility can be prosperous unless the community it serves is prosperous. Utilities do not create business in a broad sense. Utilities serve the particular line of business for which they were organized. Utilities may hamper business because of lack of the required equipment, or because of indifference or inefficiency, or because of prohibitive rates. The first may be due to lack of foresight, or to inability to secure the funds to purchase equipment. The second may be due to bad management. The third may be due to a wrong conception of the functions and duties of a utility. Most, if not all, of these conditions have been or can be remedied by competent utility commissions, State and national. Both the community served by, and the stockholders of, utilities as a whole were fortunate in having commission control during the past few years. Of course, there are opponents of commissions among the utilities as well as objectors among the people. The former comprise the profiteers, and public-be-damned type, and the latter include the selfish, narrow and can't-be-convinced class.

We can all remember the frequent application of the term "profiteer" to those who, during the war, took advantage of conditions and who made 100 per cent and up. Did any one hear of any utility being accused of profiteering? They did well to keep their plants operating, and many would have been bankrupt had it not been for the public service commissions.

If utilities are directly dependent upon the business success of their customers, so are the latter interested in the financial and mechanical condition of the utilities serving them. A failure in service of gas, railroad, telephone, electric, water or other utility reacts upon the consumer and may mean a loss to him in the year's business.

What have these statements to do with our subject?

While no comparative figures for gas companies are given in this paper, they are easily obtainable and will show some interesting results, we believe. The object-lesson is clear.

The paper was presented at the annual meeting of the Indiana Public Utility Association.—Editor.

Interdependence of Business and Utilities

The attempt has been made to show the interdependence of business enterprises and utilities.

The subject does not mean that the load or output of a utility is a forecast of business conditions, as a barometer is of the weather, but that the output, and therefore the revenue, is governed or affected by such conditions.

The writer regrets that the limited time at his disposal did not permit as thorough an investigation of the question as the subject warrants, but the few examples to be cited will serve to support the statement that utilities are affected by good or bad business conditions. Statistics on steam roads were not obtained, but everyone is cognizant of their position.

The effect upon telephone utilities is reflected in their toll charges; upon water and electric utilities in their output or consumption.

The figures on water and electric output are limited to industrial consumption, when obtainable, as the domestic or household consumption does not vary in the same degree as that of industrial consumption. In some cases only the total yearly output was furnished.

As there might be some objection on the part of the utility to make its data public, the names will not be used.

Under electric there are the following:

Company	Year	Domestic Kw.-Hr.	Industrial Kw.-Hr.	Total Kw.-Hr.
"A"	1919	8,964,400	58,063,225	67,027,625
	1920	11,718,522	75,061,830	86,780,352
11mo.	1921	11,653,391	63,680,680	75,334,071

This company had about 6,000 more consumers in 1921 over 1920.

Company	Year	Domestic Kw.-Hr.	Industrial Kw.-Hr.	Total Kw.-Hr.
"B"	1919	3,861,836	36,951,187	40,813,023
	1920	4,118,000	50,338,322	54,456,322
	1921	4,496,992	50,794,884	55,291,876
"C"	1918	not given	3,942,057	not given
	1919	not given	4,640,896	not given
	1920	not given	6,666,840	not given
	1921	not given	6,656,679	not given

Water

	Year	Domestic Gallons	Industrial Gallons	Total Gallons All Purposes
"A"	1917	not given	not given	717,143,500
	1918	not given	not given	843,621,850
	1919	not given	not given	929,046,950
	1920	not given	not given	957,866,350
	1921	not given	not given	842,567,900
"B"	1915	not given	not given	8,084,722,000
	1916	not given	not given	8,916,052,000
	1917	not given	not given	9,490,643,000
	1918	not given	not given	9,892,852,000
	1919	not given	not given	10,087,437,000
	1920	not given	not given	11,037,902,000
	1921	not given	not given	10,362,008,000
"C"	1919	not given	not given	284,711,778
	1920	not given	not given	301,839,115
	1921	not given	not given	310,435,907
"D"	1919	not given	629,531,000	3,704,760,000
	1920	not given	764,602,000	4,196,140,000
	1921	not given	not given	2,429,670,000

Four months ending Dec. 31, 1919 1,266,150,000
Four months ending Dec. 31, 1920 1,358,990,000
Four months ending Dec. 31, 1921 573,310,000

This company advises that the total data for industrial consumption for 1921 is not complete, but estimates the reduction in industrial consumption for September, 1921, over the same month in 1920 to be 34.4 per cent, of October 30.4 per cent, of November 15.2 per cent and of December 16.2 per cent. The plant has been fully metered since September, 1921, thus accounting for some of the reduction shown above.

	Date	Domestic and Commercial	Industrial	Total (All Purposes)
"E"	1918	912,236,100	975,500,500	1,887,736,600
	1919	1,072,374,400	252,852,500	1,325,226,900
	1920	1,155,942,200	240,975,900	1,396,918,100
	1921	1,226,393,500	143,740,300	1,370,133,800
"F"	1919	402,879,750	734,783,250	not given
	1920	425,570,250	797,823,750	1,305,989,000
11mo.	1921	420,976,500	587,454,000	1,065,861,250

This plant is 98.6 per cent metered.

This plant has all industrial consumption metered and about 70 per cent of all services metered.

Telephone

	Year	Toll Business
"H"	1918	$13,483.23
	1919	16,870.05
	1920	19,503.78
	1921	17,632.42

While only one telephone utility reported, it is understood that above comparison of figures would apply to all companies.

While the general trend of the data cited shows a material reduction of output for 1921, care should be exercised in analyzing the figures. Local conditions, weather and other causes may have an influence, and comparisons between plants are not governing or decisive. It may be added that this is especially true as regards rates.

Use of Low-Pressure Gas Burners in Oil-Field Burners

M. P. Youker and G. S. Brewer, of the Bartlesville Station, have completed the report on the "Use of Low-Pressure Gas Burners in Oil-Field Burners," giving complete results of tests made with eleven low-pressure gas burners in an experimental boiler. The investigation has shown that low-pressure gas, vast quantities of which are now being wasted, can be successfully used to generate steam for drilling purposes. Results of the work show that the multiple Bunsen type of burner is the most satisfactory type tested. For any given gas pressure the capacity of a gas burner will depend upon the number and size of gas jets used. The report is being prepared for printing by the Mid-Continent Oil and Gas Association, of Tulsa, in its Yearbook.

	Domestic and Commercial	Industrial		Total Consumption (All Purposes)
		Manufacturing	Railroads	
"G"—Year ending Dec. 31, 1917	185,671,528	99,148,965	279,066,968	951,203,000
1918	182,214,942	111,836,420	252,745,931	959,900,000
1919	204,773,496	121,486,722	263,686,592	959,600,000
1920	217,044,508	130,470,000	307,854,036	1,001,100,000
1921	250,112,785	140,000,327	257,059,174	984,490,000

As the Journal Views It

B.t.u. Standard in New York State

While no official announcement has been made, it is apparent that the Public Service Commission of New York State is about to discard the antequated and obsolete candle-power standard that has been enforced for so many years, to replace it with the more modern, efficient and economical B.t.u. standard. This action was heralded in statements that appeared in various newspapers recently, in which it was said that the "gas companies had gained a great victory."

It is true that for many years gas company executives have been against the foolish standard that has been hampering operation in New York State, but this opposition has been based on common sense and a desire to eliminate waste from operation.

According to information that seems to be somewhat general, the new standard will be in the neighborhood of 500 B.t.u. If so, this surely will result in more efficient operation.

But the change is going to be followed by a great deal of unrest that will be kept alive by certain of the yellow newspapers whose circulation is based on their sensationalism. One of the "arguments" that will be advanced will be that of lower rates. We fail to see just where the two are so closely related. There are many things to be taken into consideration before any reduction in rates is contemplated, not the least of which is the fact that gas properties have been operating for a number of years at losses that if they befell the ordinary business would force a receiver or absolute failure. But despite these conditions, the gas industry has carried on, and if it is going to be possible to render more adequate and satisfactory service—and that is just exactly what this reduction means—and at the same time make some saving, it is only proper that these losses should be made up.

It is the desire of gas company executives to give the most efficient service possible at the least possible cost to the customer, and we are convinced that this is generally understood by the public, but this does not halt these politicians from attempting to make capital out of any reduction.

When this change in standard becomes effective we advise all companies to explain just what it is going to mean to the consumer, so that much of the complaint will be eliminated. In fact, it would be a very good idea to start this kind of education right now.

We are glad indeed that the Public Service Commission has become convinced that New York State should be with the leaders in maintaining efficiency of operation.

Novel Meeting Successful

A week or so ago the Indiana Public Utility Association held its annual meeting under extremely novel conditions, and, as predicted in these columns a short time ago, proved to be immensely successful.

The gathering was held at the University of Indiana, Bloomington, and a feature was the presence of the undergraduates at each session. The problems of the utilities of the State were discussed frankly and fully, and as a direct result it can be said that every student of that great university will have a more kindly understanding of the problems that are involved in giving service. It was the most constructive method of group advertising that has ever been devised.

But there is another side to the question that is equally important: Many of the students have not decided just what line of endeavor they will engage in when they leave their alma mater, and there is no reason why they should not at least investigate the public utility field when they come into the business world. They are a high type of American, and the training that they are receiving in this great State university is the kind of training that will qualify them for executive positions in our field. We believe that other State associations could well utilize this idea.

The entire credit for the success of the meeting belongs to John C. Mellett, the executive secretary of the association, through whose efforts the program was run off without a hitch. He conceived the idea, and then, working in close harmony with the other officers of his association and the university authorities, carried out a successful meeting. Mr. Mellett is the type of man that the public utilities should constantly seek. He is progressive, energetic and capable to a marked degree, and we are glad, indeed, that his time and attention are being devoted to creating closer relationship between utility and public.

Faith in the Future

It seems as if recently all of the alarmists of the world have chosen the gas industry as a subject for their predictions of calamity, and the dire things that are going to happen to us, according to these prophets, will mean our elimination, not to say total annihilation. We are not a Pollyanna, nor do we believe that a crisis can be overcome by avoiding it, but we do say that most of those who have been talking don't know what they are talking about. But, as usual, it is the empty box that always makes the most noise when hit.

Undoubtedly the gas industry is going to have its share of problems. Of that there can be no doubt. But these problems are going to be solved exactly as have hundreds of others that have faced the industry in the past.

Recently there has been completed in the United States one of the largest gas plants of the world. This plant was built with money that was borrowed, and men who are keen-visioned have pledged their credit for some time to come that this plant might be a reality. Surely they would not have carried out transactions involving millions of dollars had they held the slightest doubt of the future of the gas industry.

As a matter of fact, close observation of conditions in a dozen different States that were visited during a recent trip, and investigation that had for its sole purpose the ascertaining of the truth regarding conditions, simply serve to strengthen the conviction that our industry is in for a period of great prosperity and for advancement that has never been equaled in any given era of the past. The observations and investigations that were carried on were made by a man trained by years of experience in this work of separating fact from fiction, and the conclusions that were drawn were not colored by desire but were based solely on conditions that revealed themselves under close scrutiny. That is why the AMERICAN GAS JOURNAL to-day is in a position to assure its readers of its absolute faith in the future and to state that the utterances of the calamity-howlers are baseless. We might say, in passing, that on the results of the investigations just mentioned depended the investment of a large sum of money in the gas industry. The investment will be made.

So, no matter what is said to the contrary, we advocate a whole-hearted faith in the future, for it is justified. It is unfortunate that there are those who issue these grave warnings without foundation, and who for the time being may gain some little credence, but we advise patience, for it will be a matter of only a short time until they are proved false prophets, and in the meantime their utterances can have no bearing on an industry of which they apparently are in total ignorance.

Crippling Public Utilities

Under the above heading, the *Daily Pioneer*, of Bridgeton, N. J., published the following editorial, which needs no comment from us:

"Public utilities have been fair game for the heckling politicians for a good many years, and there has been a large part of the public which has been willing to follow any lead in attacking corporations which were giving public service. For some reason there have been people who have felt that trolley companies, electric companies, gas companies could furnish a service for less than cost, and maintain their business. All through the war period when everything was tripling in price it was demanded that the nickel trolley fare should be maintained and that gas should be funished for a dollar per thousand feet. No one would give half as much for a nickel in any commodity upon the market, but a car ride was demanded for the five-cent piece, and all other corporations regulated by the State were required to struggle along with the vastly increasing costs and expenses without being permitted to add to their charge for service.

"There could be but one result. The Millville Traction Company, now going out of business is an illustration.

"It may be remembered that during the war the Bridgeton Gas Light Company filed an application with the State Public Utility Commission for the privilege of increasing its gas rate to $1.25 per thousand feet. At once there was a violent protest and a public meeting was called and funds raised for the purpose of fighting the increase before the commission. Lawyers were employed and the protest was made, with the result that the $1.25 was not allowed. The Gas Light company continued its service as best it could, but it could not maintain its plant as it should have been maintained, and the result was that finally the commission was obliged to allow an increase which made the people of Bridgeton pay a rate of $1.70. This rate still maintains, and it will take some time before the rate can be reduced by reason of the work which must be done to make good the depreciation and losses of the period when the company was getting $1.15 for gas which cost them to put it in the pipes $1.30.

"It has been authoritatively stated that had the company been permitted to make the $1.25 rate originally asked for at the time the application was made, it is quite probable that there would never have been a rate of more than $1.50 in Bridgeton. The unintelligent and wholly mistaken attack made at the time has cost the people of Bridgeton dearly, just as every prejudiced attempt to interfere with legitimate corporations and the proper conduct of their business costs the dear public money.

"It is time now that the people should realize that corporations cannot by legerdemain or in other way, do what any business man or firm cannot do, and that is continue to do business at less than cost, and that corporations are just as honest and in most instances more economical than the average business combination of any character."

Developments in Gas Technology

Important Information Gathered from All Parts of the World

By ISMAR GINSBERG, B.Sc., Chem. Eng., Associate Editor

Treatment of Thionate Gas Liquors

German patent No. 339,612, assigned to the Gasabteilung G.m.b.H., refers to a method of removing the sulphites and bisulphites from the polythionate gas purification liquors by allowing them to stand for so long a time that the sulphuric acid generated from the polythionates decomposes the sulphite. The polythionates may be formed by introduction of sulphur dioxide. The solution may be warmed to accelerate the reaction.

Drying of Coal and Yield of Tar

An investigation was made to determine whether the preliminary drying of brown coal or lignite had any influence on the subsequent yield of tar in the gas distillation process. The report of the experiments undertaken with this purpose is given in *Brennstoffe Chemie*, 1921, pages 241 to 244. Various lignites, containing different percentages of moisture, were distilled and the yield of the products of distillation were determined in each case, in addition to the properties of the products obtained. The results indicated that a preliminary drying of the coal had but little effect on the yield of tar, and that the project of predrying of coal would not yield sufficient additional output to warrant its commercial application. The yield of tar is affected by other conditions. The author gives a detailed description of these, with tables of experimental data and curves.

Naphthalene from Coal Gas

A series of experiments, which have yielded very important results, was recently made in the gas works in the city of Harlem, Holland, on the washing out of naphthalene from coal gas by the aid of water gas tar (see J. H. Steinkamp, Het. Gas, 1921, 163-165).

The gas oil, whose composition is very important in determining that of the tar, has a specific gravity of 0.855 at 15 deg. Cent., and distills mostly between the temperatures of 200 and 300 deg. Cent. The temperature of the gases amounted to 700 deg. Cent.: the water gas tar had a specific gravity of 1.0277 at 15 deg. Cent., and gave the following results on distillation: Water, 0.25 per cent; light oil to 170 deg. Cent., 15.25 per cent; middle oil, 170 to 230 deg. Cent., 14 per cent; heavy oil, 230 to 270 deg. Cent., 28 per cent; anthracene oil, 270 to 320 deg. Cent, 30 per cent, and residue, 12.50 per cent.

Preliminary tests indicate that at 0 deg. Cent. the water gas tar will dissolve 20 per cent of naphthalene. The coal gas enters the naphthalene washer at a temperature of 20 to 22 deg. Cent. It was thought advisable at first to heat it as well as the tar to a temperature of 28 to 30 deg. Cent. before effecting the absorption of the naphthalene, but it was found afterwards that this was entirely unnecessary, inasmuch as the tar absorbs the naphthalene just as well at low as at high temperatures. After washing with the water gas tar, the gas contained in every 100 c.m. 4.2 grams of naphthalene at 29 deg. Cent., 4.8 grams at 25 deg. Cent., 6.2 grams at 24 deg. Cent. and 5.1 grams at 24 deg. Cent. In different days the naphthalene content of the gas varied from 4.2 to 5.6 grams per 100 c.m. Inasmuch as about 40 per cent of water gas was added to the washed coal gas, the naphthalene content in the mixed gas always was under the permissible maximum of 4 grams in 100 c.m.

The analysis of the tar, after absorption had taken place, to determine its naphthalene content by taking its specific gravity was found to be useless, as a content of 5 per cent of naphthalene made a difference of only 0.002 in the specific weight. On the other hand, fractional distillation of the tar gave the desired results.

The use of water gas tar in the place of anthracene oil for washing the naphthalene out of the coal gas renders unnecessary an oil distillation apparatus, and also results in a saving of fuel, inasmuch as the coal tar will absorb the naphthalene sufficiently well at the ordinary temperature.

The Use of Gas in the Kitchen

Dr. K. Bunte has written a detailed article on the use of gas in the kitchen (see Das Gas und Wasserfach, 1921, 745 to 750). The author describes a series of gas burners, gas stoves and ranges for cooking and baking, which are all naturally of German construction and accordingly of little interest to American readers. However, he has something to say on the possibility of increasing the efficiency of the gas range, which is of some interest. He claims that future improvements in gas cooking lie rather with improving the pots in which the cooking takes place than in the gas range itself. A sketch of a typical gas range is shown and the losses of heat that occur therein are indicated graphically. The importance of matching the pot to the flame is emphasized. In order to save gas the size of the flame should neither be too large nor too small for the size of the pot.

In conclusion, Dr. Bunte points out that the gas works must look after the gas ranges, keep them in order, instruct the housewife how to use them properly and efficiently, give gas of uniform quality and uniform pressure and in general make it their business to keep in close contact with the consumer of gas. In this way only will gas be able to compete with other fuels in the kitchen.

Neutral Ammonium Sulphate

To make a neutral ammonium sulphate it is, of course, desirable that the liquor in the ammonia saturator be as little acid as possible, as a large amount of acid would necessitate the use of considerable quantities of the neutralizing agent in the neutraliza-

tion of the crystals removed from the saturating apparatus. But, in the case of by-product coke oven operation especially, it is quite necessary or at any rate desirable to maintain the acidity at a considerably higher degree, due to the fact that low acidity tends to promote the production of compounds with the cyanogen compounds in the gas entering the saturator with the resulting discoloration of the sulphate. High acidity counteracts this action.

In order to be able both to avoid the formation of these compounds and still work at the more favorable low acidity, the South Metropolitan Gas Company, of London, has devised a process of making neutral ammonium sulphate without any danger of discoloration of the product by cyanogen compounds. The process is protected by British patent No. 170,613.

The process is based on a well-known reaction, which takes place between a cyanide and a polysulphide, resulting in the formation of a sulpho-cyanide. This reaction has often been used for the purpose of removing hydrocyanic acid gas from coal gas. In the present process the gas is either first washed with a polysulphide solution previous to its entrance into the saturator, or else the polysulphide is added or produced in the ammoniacal liquor before it is distilled. For example, just before the ammonia liquor is removed from the saturator to be transferred into the still, a sufficient quantity of ammonium polysulphide is added to convert all the cyanide in the liquor into the sulpho-cyanide. Or, finely divided sulphur may be added to the liquor, or else the vapors from the still may be passed through spent oxide contained in suitable vessels capable of alternate operation. The polysulphide may also be formed in the ammonia liquor by blowing air or other gas containing oxygen or its equivalent through the liquor before the latter is introduced into the still. In the so-called direct ammonia recovery process the gases are washed by any suitable method with the polysulphide solution before they enter the saturator.

Picked Up Here and There

Little Items of Interest to the Gas Industry

Walter S. Greenough, whose name is familiar to all readers of the AMERICAN GAS JOURNAL, for the splendid material that he has contributed to these columns, was in evidence at the annual meeting of the Indiana Public Utility Association, held recently at the University of Indiana. Mr. Greenough now has a responsible position with the Fletcher Savings & Trust Company, of Indianapolis, where he is in charge of public relations and is making a wonderful record. Mr. Greenough knows his business thoroughly and would be a mighty valuable man for some utility company. He has splendid ideas and if he could be induced to turn his talents to building in our field it would be a distinct gain.

John F. Weedon, superintendent of advertising of the Peoples Gas of Chicago, is an extremely busy man and his office is a point of call for many men during the day. But Mr. Weedon seems to have time for all and to handle everybody with marked courtesy. Within a few weeks we hope to make an announcement regarding Mr. Weedon that will be gratifying to his many friends. Mr. Weedon would not let us say what the announcement will be, when we saw him a short time ago in Chicago, but we have his promise that when he is ready he will let us tell the gas industry through the columns of the AMERICAN GAS JOURNAL.

E. J. Burke, sales manager of the Citizens Gas Company, Indianapolis, and secretary of the Indiana Gas Association, has rearranged his salesroom and it is now one of the finest in the Middle West. Mr. Burke's office is on the mezzanine floor which extends across the rear of the large salesroom and he is in a position to keep in close touch with all of the developments in his department. Also he is readily accessible to visitors and always has a cordial greeting. It might be said in passing that Mr. Burke has some progressive ideas on the subject of public policy and they are working out successfully.

Hector Prud'homme, vice-president and general manager of the Belgian-American Coke Ovens Corporation, has the happy faculty of impressing on his visitors his real interest in the caller and his business. Recently when a caller dropped into his office in St. Louis Mr. Prud'homme devoted an entire morning to making the "out-of-towner" at ease. Any gasman who gets into St. Louis will find it well worth while to drop in and receive the cordial greeting of Mr. Prud'homme.

No matter how busy George Parker, of Russell Engineering Company, is, he always has time to discuss the latest developments in the gas industry. He has some interesting theories also and his wide experience gives weight to his ideas. Mr. Parker, we understand, is now traveling through the East.

H. H. Lackey, of the Benson Manufacturing Company, who is a peddler of Nu-Style gas irons, comes from Kentucky and has about as much use for the letter "R" as he has for electrical flatirons.

Lackey says that he has been taking some lessons in pronunciation, with their German "wash lady" as instructress.

She asked him to say "pork."

Lackey said something that sounded like "poke."

She shook her head sadly.

Then she asked him to say "door."

He replied, "doah."

She frowned and said, "Can't you say your 'R's' like the 'R' in 'book'?"

Under 80-Cent Rate N. Y. Consolidated Stands to Lose $8,469,038 in 1921

Company Will Be Reimbursed Upon Favorable Determination of the Appeal Now Pending in U. S. Supreme Court

The following is a condensed statement of the Consolidated Gas Company of New York, December 31, 1921:

ASSETS

Fixed assets, including land, plant and equipment	$55,246,040.16
Bonds and stocks of and advances to affiliated companies and other investments	130,217,770.07
United States Liberty Loan bonds	2,502,000.00
Cash	2,178,480.35
Accounts receivable	4,280,303.15
Material and supplies	1,766,695.80
	$196,191,289.53

LIABILITIES

Capital stock	$100,000,000.00
Five-year secured 7 per cent convertible gold bonds	25,000,000.00
One-year secured 7 per cent gold notes	20,000,000.00
Other obligations	2,400,000.00
Accts. payable and accrued charges	8,606,723.61
Stock premiums	13,918,878.23
Renewal and reserve funds	13,265,495.72
Profit and loss	45,217.78
Gas sales suspense*	12,954,974.19
	$196,191,289.53

*Amount of gas sales resulting from the increase in the price of gas above the statutory rate of 80 cents per thousand cubic feet not included in the earnings pending final action of the United States Supreme Court.

The figures thus far available respecting the Consolidated Gas Company's operations for the calendar year 1921 indicate that the loss from its gas business during the year amounted to at least $8,469,038.65

(The loss from the company's gas business in 1920 amounted to $4,343,286.09.)

The rentals derived from the use by others of properties not wholly devoted to the gas business of the company yielded $336,418.37

The dividends and interest, applicable to the year 1921, received on stocks, bonds and other obligations and on advances made to affiliated gas and electric companies, operating in the boroughs of Manhattan, Queens and The Bronx and in the County of Westchester, amounted to $9,383,665.68

The interest which accrued during the year on funded and other debt, chargeable against earnings, amounted to $4,230,582.81

Dividends were paid during the year on the company's capital stock at the rate of 7 per cent per annum, amounting to $7,000,000.00

The loss from the gas business ($8,469,038.65) and the excess, over income from other sources, of interest and dividends paid ($1,510,498.76) resulted in a charge against the profit and loss account of the Consolidated Gas Company amounting to $9,979,537.41

It will be observed that the loss from the company's gas business during the year amounted to at least $8,469,038.65. As an offset to this there accrued during the year the sum of $10,158,246.11, representing the revenue from gas sales resulting from the rates charged under the final decree of the District Court in excess of the statutory rate of 80 cents per thousand cubic feet, which revenue has not been included in the earnings pending the final action in the United States Supreme Court.

During the months of January and February, 1921, the rate charged was that fixed by the District Court in its final decree in August, 1920—viz., $1.20 per thousand cubic feet. On March 1, 1921, the price of gas oil, in the meantime, having been increased from 7 cents to 12¼ cents per gallon and the prices of other materials, as well as the cost of labor, having increased substantially, and the District Court having denied the request of the defendant public authorities for a continuance of the $1.20 rate fixed by the court, the rate was increased to $1.50 per thousand cubic feet.

On August 1, 1921, the price of gas oil having been reduced to 6 cents per gallon, the price of gas was voluntarily reduced by the company to $1.25 per thousand cubic feet. This rate is still in effect.

The rates charged for gas during the year 1921 were at all times below what could have been established as the actual cost of producing and distributing gas, including a fair return on the investment.

The operating loss from the company's gas business in 1920 amounted to $4,343,286.09, and in 1919 to $1,853,759.26, making the total operating loss from the company's gas business for the years 1919 to 1921, inclusive, $14,666,084.

Expect Favorable Determination of Impending Appeal

In view of the fact that the final decree in the Dis-

trict Court sustained the company's claim that the 80-cent rate was confiscatory, and therefore invalid, and that the revenue from the company's gas business derived from rates in excess of the statutory rate under the final decree aggregated on December 31, 1921, $12,954,974.19 (which, upon the favorable determination, confidently expected, of the appeal pending in the United States Supreme Court, will be applied to reimbursing to that extent the surplus account of the company, depleted, as stated, by operating losses in the last three years to the extent of $14,666,084), the policy of continuing the payment of dividends at the customary rate during the year 1921, with the result of further encroaching upon the company's book surplus, under the circumstances has been fully justified.

As stated in our last report, the capital stock of the Consolidated Gas Company is essentially an investment security, only a small percentage of it being held by brokers in behalf of clients. Of the 10,315 shareholders, 71½ per cent own less than fifty-one shares each.

The deficiency in the company's earnings during the five years from 1917 to 1921, inclusive, below the cost of gas, including a return of 8 per cent upon its investment in its gas properties, aggregates no less than $34,316,295.61. The additional deficiency in the earnings of the affiliated gas companies during the same period has been, on the same basis, not less than $23,000,000.

The defendants in the action brought by the company to test the validity of the 80-cent rate have contended that against the losses sustained by the company due to the inadequacy of the 80-cent rate there should be credited the amount of the company's "contingent reserve." In other words, that the loss above referred to, of $34,316,295.61, should be deemed to have been compensated for through the medium of this reserve to the extent of $11,801,659.48. Obviously the reserve was not created for any such purpose. Nor was it accumulated at the expense of the consumers, who never paid a penny more for their gas because of it. The Public Service Commission has never allowed, and would not allow, a charge to be made against the consumers for such purpose. This reserve represents a segregation of the company's earnings from all sources, prudently set aside during a period when the rates for the service yielded actually less than a fair return upon the investment, as an insurance against uninsurable hazards stated in the resolution of the trustees by which it was created, to include "fire, flood, earthquake, insurrection or riot or any other hazard." The inability of the company, during a period of high prices for labor and material employed in the production and distribution of gas, to collect rates for its service adequate to enable it to even meet its current operating expenses—to say nothing of earning a fair return upon its investment—because of the existence of a statutory rate from which it could not obtain relief except by protracted litigation in the courts, cannot be construed as a "hazard" of conducting the gas business. Under both the State and Federal constitutions the company is at all times insured an adequate return on the value of its property; and there would be, therefore, no justification for the creation of a fund to protect it against a flagrant denial, on the part of the State authorities, of its constitutional rights. In other words, with the right of regulation exercised by the State under constitutional prohibitions against confiscatory rates, it cannot be conceived that in "other hazards" was included a provision against a violation of the Constitution through the operation of a statutory rate obviously confiscatory. The clear distinction, in this respect, between a business that is regulated and one that is not regulated cannot be too strongly emphasized. Consequently, to appropriate the reserve under the guise of thus compensating the company in part for losses sustained under the 80-cent rate would amount to plain confiscation of the stockholders' property, and would penalize the company and its stockholders for their prudent and conservative dividend policy.

On the other hand, the company's position has been and is that in determining the reasonableness of rates to be charged in the future, consideration must in justice be given to the deficiency in earnings shown above to have amounted during the past five years to $34,316,295.61, after crediting thereto the total amount of revenue ($12,954,974.19) derived from the rates charged in excess of the statutory rate and segregated, as stated, from the earnings pending the determination of the appeal of the defendants to the United States Supreme Court. To all intents and purposes it represents an additional investment on the part of the stockholders in the company's gas business, and under the ruling of the Court of Appeals of this State, in People ex rel Kings County Lighting Co. vs. Willcox (210 N. Y. 479), it constitutes an amount upon which the company is entitled to earn a return until or unless it is amortized out of earnings rendered adequate for that purpose by the inclusion in the rate to be charged for gas of an adequate allowance for this purpose.

Costs of Material and Labor Have Not Declined Below 1918 and 1919 Unit Cost

There is no foundation in fact for the assertion sometimes made, but never supported by details, that the cost of materials and labor entering into gas operations has declined in 1921 or 1922 below the 1918 and 1919 unit costs, which were the bases of the earlier adjudications as to the rates of this company and its affiliated companies. Reduction has come, in a few instances, from the "peak" prices of late 1920 and early 1921, but the decline has not carried the costs below those obtaining in 1918 and 1919. This is shown by the following comparisons of average yearly costs:

	1918	1919	Dec. 31, 1921
Gas coal (per gross ton)	$4.97	$5.77	$7.51
Generator coal (gross ton)	6.68	7.98	10.73
Gas oil (per gallon)	.065	.065	.06
Labor (av. rate, per hour)	.396	.448	.569

The particular matter of litigation which is of paramount concern to the officers and stockholders of this company is the determination of the appeal to the United States Supreme Court, prosecuted by some of the defendant authorities from the final decree entered in the District Court in August, 1920. This appeal was argued before the Supreme Court on November 15 and 16, 1921, and a favorable decision is hoped for. Affirmance of the decree, with the modification asked for by the city, would terminate the litigation and entitle the company to retain

the sums collected in excess of the statutory rate. Any retrial, with direction to take into account a broader period of test of confiscation, would only bring before the court the still higher costs of late 1919 and of the years 1920, 1921 and early 1922, whereas this case was primarily litigated only upon the costs of 1918 and early 1919.

In the various trials of the rate suits of this company and its affiliated companies during the year every essential fact shown by the records of the companies and every essential contention of counsel for the companies have been judicially sustained and fortified. Much of the time and expense necessitated for this demonstration of the correctness of the companies' claims would have been unnecessary had the defendant public authorities shown a disposition to accept indisputable facts and had they refrained from seeking delay for the mere sake of delay. In the ultimate analysis the consumers and taxpayers have to defray the expenses of all parties to litigation of this character; and the tactics of the defendants have added enormously to that expense with no result except delay of justice.

A few weeks after taking office the new Public Service Commission instituted a general hearing as to all gas rates within the city of New York, and required all the companies to file with the commission early in June minutely detailed statements of manufacturing and distribution costs, coal and oil contracts, both in relation to current operations and, for comparative purposes, for earlier years. Monthly statements of operating costs have also been required since that time, in addition to the detailed data as to capital additions and retirements, which, for several years, have been required by the regulatory body to be submitted for its periodic verification and check. As to the rates of certain companies, the commission, in the light of the filed statements, ordered that hearings proceed; and it is expected that within the next month or two a determination will be reached as to the New York & Queens Gas Company and the Bronx Gas & Electric Company, which have shown justification for the amendatory schedules filed by them increasing their rates above those now in force. In pursuance of the general policy of the commission, the taking effect of these schedules was suspended until the close of the hearings, with the result that these companies can never recover the loss due to unremunerative rates for the gas supplied during the past six months, except through the inclusion of such loss in the amount upon which future rates are computed.

The aggregate capital expenditures of the Consolidated and its affiliated gas and electric companies for the year 1921 were $42,396,100.98, of which $33,624,175.06 was for electric property and $8,771,925.92 for gas property. The expenditures for the year 1920 were $29,817,035.96, of which $21,190,800.48 were for electric property and $8,626,235.48 for gas property. It is estimated that in the year 1922 it will be necessary to expend for additions and extensions to the gas and electric manufacturing and distributing systems approximately $34,181,634.31.

The combined sales of gas of the various companies during the year were 36,282,751,000 cu. ft., a decrease below the previous year of 4.78 per cent.

The sales of electric current during the year, including that sold to the Third Avenue Railroad Company, the Brooklyn Rapid Transit Company and the New York, New Haven & Hartford Railroad Company, amounted to 1,186,346,264 kw.-hr., an increase over the preceding year of 17.25 per cent.

The taxes charged against the earnings of the Consolidated company and its allied gas and electric companies during the year amounted to $9,840,077.92, as compared with $7,620,497.28 charged against earnings of the preceding year.

At a cost of $10,559,030.01 for repairs and $1,454,296.13 for renewals, or a total cost of $12,013,326.14, all of these gas and electric properties have been maintained in excellent repair and at the highest possible point of operating efficiency, thus insuring a uniformly satisfactory quality of gas and electricity and their economical production and distribution.

Carbonization of Lignites Produces High-Grade Fuel

Washington, D. C.—Lignite, or "brown coal," which constitutes approximately one-third of the nation's coal resources, can be converted by carbonization into a high-grade fuel adapted to a wide range of purposes and limited only by its relative cost, according to a statement issued by Director H. Foster Bain of the United States Bureau of Mines. It cannot, however, be classed as a cheap fuel in the sense of competing with a high-class, easily mined bituminous coal.

A lignite carbonizing plant has been erected by the University of North Dakota at Hebron, N. D., in a field whose lignites are similar to those found in the Nenana field in Alaska. Dr. E. J. Babcock, dean of the engineering department of the university, has been for years directing experiments in carbonizing and briquetting lignites and has made notable progress.

During the past summer, the United States Bureau of Mines has co-operated with the university in the operation of the plant, and more than a thousand tons of raw lignite have been treated and more than 400 tons of lignite char briquettes were produced, this being probably the largest amount of lignite char briquettes that has ever been made at one time.

By removing the moisture and a considerable portion of the volatile matter from the raw lignite, a char can be obtained which possesses a heating value and chemical analysis quite similar to anthracite coal. In this process, a ton of raw lignite will yield 40 per cent of high-grade lignite char. The physical form of this char is such that approximately one-third of it will go through a one-eighth-inch screen, the remainder up to pieces the size of shelled corn. By the addition of 8 to 10 per cent of suitable binding material, excellent briquettes can be made, whose heating value for general use is little less than that of anthracite

The fixed carbon in these briquettes may run from 72 to 81 per cent, as compared with that of 35 per cent in raw lignite. This makes it practicable to transport the fuel to much greater distances than would be practicable with raw lignite. The briquettes are pillow shaped, weighing about two and a half ounces each. When produced with suitable skill, the briquettes will stand handling, transportation and weather conditions in storage. The product is a stable one, thus removing the greatest limitation to the usefulness of the original lignite.

It is estimated that, of the present known lignite resources, 964,24,000,000 tons are in North and South Dakota and northeastern Montana, approximately 23,000,000,000 tons in Texas, 7,404,300,000 tons in Alaska and relatively smaller amounts in other States.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	Jan. 26, 1922 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	97½	98½
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	88	89½
Columbia Gas & Elec. Co.	First 5s	May 1, 1945	88	89¾
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	105	107
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	83½	84
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	103¼	103½
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	72	75
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	85	88
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	95	97
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	96	98½
Hudson County Gas Co.	First 5s	Nov. 1, 1949	86	88
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1943	87½	89
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	98½	100
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	85	88
Milwaukee Gas Light Co.	First 4s	May 1, 1927	89	91
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	88	88½
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	105	106
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	93	95
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	85	86
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	91	92½
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	86	89
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	78	82
Southern California Gas Co.	First 6s	Nov. 1, 1950	94	98
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	83	86
Washington Gas Light Co.	General 5s	Nov. 1, 1960	89¼	91
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	85	87

"1922 Investments"

A new thirty-two-page booklet under the above title is now ready for distribution by H. M. Byllesby & Co. It describes in detail twenty-six offerings of public utility, municipal and industrial securities, consisting of bonds, notes and preferred stocks, which are recommended to the public because of their strong investment values. In addition there is a list of odd-lot offerings of utility bonds and notes, yielding from 6.30 to 8 per cent.

The following foreword is reprinted from the booklet:

"The closing months of the year 1921 constituted one of the most remarkable investment bond periods in our history. The practical completion of industrial liquidation, a tendency toward a satisfactory readjustment of tax burdens together with a decidedly easier money situation, have combined to bring about a rapid advance in prices of all high-grade investment bonds. No class of bonds has had a more decided rise than public utility issues. Their popularity is attested by the fact that holders of this class of bond have increased in number more than 300 per cent during the last three years.

"It is our belief that the year 1922 will be featured by a steady rise in bond prices with lessening yields to the investor.

"It is still possible to obtain conservative investment securities at prices yielding far above normal returns, and we are presenting for your consideration a diversified list of high-grade public utility issues including also several seasoned industrial bonds and selected municipal issues.

"We recommend your prompt consideration of the offerings listed herein."

The closing pages are devoted to a description of the services offered to investors by H. M. Byllesby & Co., together with an outline of the bond department personnel of that organization. Copies may be secured upon application to the publicity department.

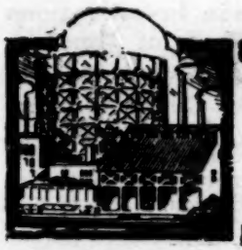
Issues Bonds

New York, N. Y.—A block of $1,822,000 Kings County Lighting Company, Borough of Brooklyn, first refunding mortgage 6½ per cent gold bonds are being offered by Blair & Co. at 99½ and interest, to yield 6.55 per cent. The bonds are dated July 1, 1904, and mature July 1, 1954. They are non-callable prior to Jan. 1, 1940.

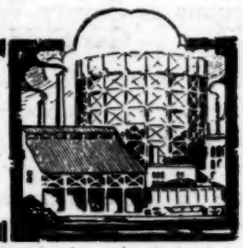
The results of the operations of the company for the twelve months ended Nov. 30, 1921, show gross revenues of $2,125,588 and total income, after deducting operating expenses and taxes, of $565,977. After allowing for annual interest requirements on the bonds the company shows a balance for reserve and surplus of $290,447.

Gas Prices Decline

In Memphis, Tenn., in 1867, the price of gas was $5.50 per thousand cubic feet; St. Louis, $4.50; Nashville, $4.50; Mobile, $5; Atlanta, $5.50; Savannah, $6; Norfolk, $6; Vicksburg, $6; New Orleans, $4; Charleston, $7; Montgomery, $8; Macon, $8; Galveston, $8; San Francisco, $6, and Sacramento, $9.



NEWS OF THE GAS INDUSTRY



Rate Reduction Announced by Consumers' Gas Company

Toronto, Ont.—The Consumers Gas Company, according to General Manager Arthur Hewitt, proposes to reduce the rate for gas from $1.25 to $1 per thousand feet, plus a service charge of 50 cents per month. The new rates will go into effect on and after Feb. 15 next. In order to encourage a greater use of gas for cooking and heating purposes, a further reduction of 10 cents per thousand feet will be allowed on all gas consumed in excess of 10,000 ft. per month, and an additional 5 cents per thousand, where the consumption exceeds 100,000 ft.

Mr. Hewitt said the new rates were based upon the scientific rate basis used by the Hydro Commission and now being generally adopted by all gas companies. In making these reductions the company was discounting the future, as its past records did not warrant such a drastic cut in rates. He estimated the saving to customers by the reduction would total over $500,000 a year. Mr. Hewitt directed attention to the service charge of 50 cents per month, which had been in partial operation for some time, where consumers had gas installed for their own convenience in case of emergency, now the charge was to be universal, whether gas was used or not. The new rates would benefit all classes except the very small consumers, but even in cases where the consumption was only 3,000 ft. per month, there would be a saving of 25 cents, compared with the old rates. Those who used 3,000 ft. or less per month would not benefit by the change, he said, but those using 5,000 ft. and upwards monthly would secure a very substantial reduction. When the new rates go into effect next month, Toronto consumers will be enjoying the lowest gas rates of any of the large cities on the continent. A further reduction in rates will be made as soon as conditions warrant i, but it is not likely to take place this year, unless there is a material reduction in the cost of coal, labor and other essentials in the manufacture of gas.

Is Allowed Increased Rate to Compensate for Cut in Service Charge

In the December 10 issue of the AMERICAN GAS JOURNAL there appeared an item stating that the Public Utility Commission had cut the service charge of the Stamford Gas & Electric Company, of Stamford, Conn., from 75 cents to 50 cents. The balance of the order, which gave an increase in rates to compensate for the cut in the service charge, was omitted. The decision in part is as follows:

"The total output of gas for 1921 is estimated by the company at 260,000,000 cu. ft. Of this amount about 81 per cent is registered by three and five light meters and a comparatively small amount is taken by consumers using over 200,000 cu. ft. per month. Assuming this latter amount is not to exceed 20,000,000 cu. ft. for the year, an increase in the commodity rate of 10 cents per thousand cubic feet on amounts less than 200,000 cu. ft. per month, should produce an amount of revenue substantially equal to the reduction in the service charge.

"Wherefore: The Stamford Gas & Electric Company is hereby ordered and directed to file with the commission and to put into effect on or before Dec. 1, 1921, a schedule of rates in accordance with the foregoing: that is, reducing the present charge for three and five light meters from 75 cents to 50 cents and increasing the present commodity rate 10 cents per thousand cubic feet on all classes of consumption not exceeding 200,000 cu. ft. per month, and leaving the present rate in force for all over 200,000 cu. ft. per month.

HARVEY HARRELD, manager of the securities department of the Oklahoma Gas & Electric Company, Enid, Okla., has been appointed chairman of the Program Committee of the Kiwanis Club of Enid.

Must Supply Gas to Mercer

Harrisburg, Pa.—The Public Service Commission has ordered the United Natural Gas Company to continue supplying natural gas to the Mercer Gas, Light & Fuel Company so that the latter could serve the borough of Mercer until such time that both companies received approval from the commission to curtail service in Mercer. The United company served a discontinuance notice on the Mercer company for Nov. 15, 1921, but has continued the supply pending the hearing before the Public Service Commission.

The question of the jurisdiction of the commission over private contracts, between one natural gas company and another and of the alteration of territory through certificate filed in the Mercer courts excluding Mercer Borough are declared to be within the control of the commission.

In its report the commission says that the discontinuance of service was evidently to compel the Mercer company to comply with an increase in rates from 23 to 48 cents per thousand cubic feet. The report discusses at length the contracts made in 1886 and the merger of various gas companies but declares that the contract with the Mercer company is binding on the United Natural Gas Company as it has accepted the contracts held by companies which it has consolidated. It quotes various court decisions in determining its jurisdiction over the disputed question.

Officers Elected at Annual Meeting

Marshall, Mich.—At the annual election of officers of the Marshall Gas Company the following officers were chosen: President and treasurer, Carroll Collins; vice-president, Craig C. Miller; secretary, E. H. Collins. Directors, C. E. Gorham, Craig C. Miller, G. W. Collins, E. H. Collins and Carroll Collins.

Census of Safety Workers in Gas Field

How many safety men are employed by gas companies and other public utilities to protect both their employees and the general public from the accident hazards in connection with their business? This will be revealed when the National Safety Council completes a census which it is now taking of all the persons engaged in safety and industrial health work in the public utility industries, as well as all persons engaged in these activities in every other industry and in public safety work also. The public utility companies have unusual accident problems to deal with because of their contact with the public in addition to the hazards to men employed in their plants, so it is expected they will stand high on the list for the number of safety men they have working. To date it has never been established definitely how many persons in the public utility industries are engaged in accident prevention and industrial health work, or how the various types of utilities compare with each other or with other industries in this respect.

This is the first time that any attempt has ever been made to list the thousands of people who are now professionally engaged in the safety movement. The census will include not only members and employees of members of the National Safety Council, but all persons engaged in safety and industrial health activities and not connected with the council at all. Many of the largest gas companies are members of the council.

Every reader of this publication who is professionally engaged in industrial or public accident prevention or industrial health work—whether he is devoting all or only part of his time to accident prevention—is urged to assist in the taking of this census by sending to the National Safety Council, 168 North Michigan Avenue, Chicago, his name and the other data requested in the council's census form which is reproduced on this page.

It is expected that when the job of taking this census is completed there will be registered at the headquarters of the National Safety Council in Chicago the name of every man and woman responsible for the safety work of every industrial plant, public utility, municipality and every organization which devotes any part of its efforts toward the promotion of either industrial or public safety in the United States. Up to the present date there has not been in existence any data to show how many persons are engaged in this work either in any single industry or class or in the country as a whole.

Industry in general and the nation at large will profit from the results of this census. It will enable the council to quickly find speakers on industrial and public safety for any occasion in any locality; authors for special article on accident prevention; writers of safety textbooks; lecturers on accident prevention and industrial health work for universities and colleges. The council at present continually receives requests from industrial companies, municipalities, civic associations, clubs, schools, colleges and other organizations for help in finding speakers or writers on safety subjects. The census records will greatly increase the facilities of the council for filling such requests.

Following is the form which the National Safety Council is sending out:

Name .....
Company or organization.....
City .....State .....
Nature of company's business.....
Is safety your principal work?.....
Please check other activities you engage in:

Fire protection	Engineering (other than safety)
Health and sanitation	Legal
Workmen's compensation and claims	Insurance
	Welfare
General executive (such as manager or superintendent)	Educational
	Industrial relations

How long have you been in your present position? .....
Technical or other special education?.....
Signed .....
Title .....

Coal and Coke Investigations of the Bureau of Mines

The sampling of coals from the mines of Carbon County, Utah, has been completed by the Bureau of Mines. A bulletin on the analyses of Utah coals generally is being prepared for publication.

At the Southern Experiment Station of the Bureau of Mines, Birmingham-Tuscaloosa, Ala., determinations have been made as to the relative combustibility of different cokes in a brick combustibility furnace. Further work was done with the shatter and friability tests, and the true and apparent gravity determinations are practically complete. Float and sink tests have been made on a sample of coke breeze submitted by the Sloss Sheffield Company to determine if sufficient ash elimination could be obtained to make feasible the mixing of cleaned coal with raw coal before carbonization.

The Pittsburgh, (Pa.) Experiment Station of the Bureau of Mines is continuing laboratory experiments on coal ash fusibility, oxidizing and reducing atmospheres by the micropyrometer method, and comparing the results with those of the gas furnace. By using a reducing atmosphere in the micropyrometer furnace fairly good checks were obtained on ash, the average in the micropyrometer method being about 150 deg. Fahr. lower. While the micropyrometer method cannot be used as an alternate method if close checks are required, it can no doubt be used as a rapid method for determining the fusibility of coal ash. The results of this investigation are now being tabulated.

A new investigation, to determine the composition of the gas arising from a fuel bed, is under way at the Pittsburgh Experiment Station.

At the central district station of the Bureau of Mines, Urbana, Ill., a study has been made of the inhibiting effect of finely divided fusain or mother coal on the coking property of Illinois coal. Coking tests were made on coal containing up to 10 per cent 200-mesh mother coal without making any appreciable deleterious influence.

Light Officials in Joint Meet

Dayton, Ohio.—A dinner on Jan. 12 at the Miami Hotel opened a two-day conference of officers of the Utica (N. Y.) Gas & Electric Company and officers of the Dayton Power & Light Company.

Following the dinner, the officials went into a conference to discuss problems relating to power and light.

The Utica officers who were present included F. B. Steele, vice-president and associate general manager; M. J. Brayton, vice-president and secretary; George H. Stack, treasurer; E. P. Peck, general superintendent of the electrical department; B. E. White, engineer; W. J. McSorley, auditor; J. F. Carney, assistant treasurer; W. J. Reagan, commercial manager, and A. H. Ruhbart, purchasing agent.

The conference was made possible through the efforts of F. M. Tait, president of the Dayton Power & Light Company, who is also president of the Utica company.

Providence Gas Issue

The big event of last week in the Providence, R. I., stock market was the sale by the Providence Gas Company, of a large issue of 5½ per cent twenty-year first mortgage gold bonds. A syndicate of Providence investment houses, consisting of Bodell & Co., Brown, Lisle & Marshall, Davis & Davis, C. A. Kilvert & Co., Richardson & Clark and W. W. White & Co., have purchased from the Providence Gas Company $3,500,000 first mortgage gold bonds, the proceeds of which will be used to retire the $1,800,000 convertible notes now outstanding and pay the floating debt which has been incurred over a period of about four years to pay for permanent extensions and improvements of the property. This is one of the largest issues of first mortgage bonds ever offered by a public utility in Rhode Island houses. The bonds are legal for savings bank investments and attractive to trustees, as they are free from tax under Rhode Island law. It is planned to retire the outstanding 7 per cent notes at 102 and interest on July 1, 1922.

Oil Drippings

Owing to cold weather and snow, the Wyoming production of oil showed only 8,750 bbl. in December, or 1,578 bbl. less than November.

Montana shows no production for December, but there are 118 drills trying for oil.

Gas from Wilbur Well Now Utilized

Long Beach, Cal.—Gas from the Shell Company's Wilbur No. 1 well is now being used commercially. The surplus flow has been turned into the mains of the Southern Counties Gas Company. The exact amount of the surplus has not been determined but it is thought to be about 4,000,000 cu. ft. The well is producing about 7,000,000 ft. daily but the Shell Company operations use a good portion of this amount.

Await Decision in Atlanta Rate Case

Atlanta, Ga.—Following the presentation of evidence in the Atlanta gas rate case at the hearing held in New Orleans, Jan. 13, three Federal judges have taken the case under advisement and an early decision in regard to the matter is anticipated.

From a public utility standpoint, the case is one of the most important heard in the South in months, as the court is called upon to decide how far a State rate-fixing commission may go in the matter of fixing rates a utility may charge. The main point involved is whether or not the Atlanta Gas Light Company, under the reduced rates ordered by the Georgia commission, will make a fair return on its total investment. The company claims it will not, and the commission alleges otherwise. In the meantime an injunction granted by the courts in Atlanta restraining the commission from enforcing the lower rate remains in effect.

Brunswick Has Lowest Rate in Georgia

Brunswick, Ga.—A reduction in gas rates for Brunswick was announced Jan. 11 by the Mutual Light & Water Company, the new rate effective Feb. 1. The present rate is $1.75 per thousand cubic feet. This rate will remain the same where less than 1,000 ft. of gas are consumed, but for every additional thousand feet the rate will be $1.25. The average consumer in Brunswick, the company estimates, uses approximately 3,000 cu. ft. per month, and this will serve to make an average reduction in bills of $1.10 per month, the reduction being the largest any gas company has made in this part of the country in some months. The rate as a whole is the lowest in Georgia and one of the lowest rates enjoyed by consumers in any city of the Southeast.

Hoopeston Gas Rule Reversed

Springfield, Ill.—A ruling of the Public Utilities Commission, ordering the Hoopeston Gas & Electric Company to make reparation to the city of Hoopeston, has been reversed and remanded by Judge E. S. Smith of the Sangamon County circuit court. He indicated that the evidence in the case should be reviewed again by the commission.

The case was filed by the city of Hoopeston and sought to recover money paid for general gas service, being the difference between the two rates.

By an order of the commission the Hoopeston Gas & Electric Company was permitted to increase its rate for a specified time. When that period ended no effort was made to reduce the rate and no ruling of the commission to that effect was recorded.

About six months later the commission again gave the Hoopeston Gas & Electric Company permission to charge the new rate.

Attorneys for the city who filed the bill seeking a reparation, alleged that the city should be refunded the difference between the old rate and the new rate for the six months during which there was no specified contract in effect.

Announces New Rate Schedule

The city of Norwich Gas and Electrical Department, Norwich, Conn., has announced its new scale of prices on gas, effective Jan. 1, to apply on bills rendered Feb. 1. The first 5,000 cu. ft. per month is 13½ cents per 100 cu. ft.; next 10,000 cu. ft. per month, 12½ cents per 100 cu. ft.; all over 15,000 cu. ft. per month, 11½ cents per 100 cu. ft. Consumer charge 90 cents per month. Consumers using in excess of 1,000,000 cu. ft. per month will be billed at 11½ cents per 100 cu. ft. for all gas consumed, plus the consumer charge.

Declares Dividend

The Massachusetts Lighting Companies, George F. Howland, treasurer, Boston, Mass., has declared quarterly dividends of $1.50 per share on the 6 per cent preferred shares and $2 per share on the 8 per cent preferred shares, payable Jan. 16, to shareholders of record on Dec. 24. The Massachusetts Lighting Companies own and control numerous gas and electric corporations in various parts of Massachusetts.

Gas Company Is Sold by Receiver

Freehold, N. J.—The Standard Gas Company, with main plant at Atlantic Highlands and serving besides that borough the municipalities of Rumsen, Shrewsbury, Keyport, Matawan, Keansberg, Marlboro and Freehold, together with all franchises and personal property has been sold by Receiver Joseph E. Stricker, of Perth Amboy, to W. W. Montgomery, Jr., a lawyer of Philadelphia, representing the bondholders' protective committee, for $25,000.

Some few years ago the Standard Gas Company, composed of Philadelphia financiers and operating the Atlantic Highlands plant, bought the old Freehold Gas Company plant and extended its gas mains from Atlantic Highlands through the municipalities to Freehold. The company then secured permission from the Public Utilities Commission and issued $610,000 in bonds for improvement and extensions to the plant and business. About a year ago the company went into the hands of a receiver and it has since been operated by Mr. Stricker. He made it plain after the sale yesterday that the old owners of the business had lost all their holdings and Mr. Montgomery said that the bondholders would organize a company to operate the plant; in fact, he said, they were prepared to take over the plant upon one day's notice and operate it. If the sale is confirmed by the court, as it is expected it will be, Mr. Stricker said he would pass title to the bondholders' committee on Jan. 27.

Will Accept New Gas Rates

Chicago, Ill.—While the Peoples Gas Light & Coke Company will not contest the reduced rates announced by the Illinois Commerce Commission, President Samuel Insull intends to institute court proceedings to test the validity of his contention that the $12,000,000 in dividends lost to stockholders in the years since the utilities have been subject to State regulation should be recouped under State sanction.

In a statement, President Insull said that the company would put the commission's rates into effect but would appeal to State courts for the protection of the interests of the stockholders. He referred to the difficulty which the commission had in solving the problem before it "in view of the evidence presented, and especially at a time when everybody wants the cost of everything reduced except the cost of that which they themselves sell."

Mr. Insull further said that the rates fixed were, in his judgment, "too close to safety in these uncertain times."

Pacific G. & E. to Call Ten Millions in Notes

San Francisco, Cal.—The Pacific Gas & Electric Company has announced that the corporation will call for redemption on May 1 the entire issue of $10,000,000 par value of its five-year 7 per cent convertible gold notes due May 1, 1924. The issue is subject to call at 101 and interest upon thirty days' notice.

The company recently sold an issue of $10,000,000 first and refunding mortgage 6 per cent twenty-year non-callable bonds, series "B," the proceeds of which are to be used to effect the retirement of the convertible 7s. This is merely a refunding operation which, Vice-President Hockenbeamer points out, will effect a saving of interest charges. Application has been filed with the Railroad Commission for authority to put through the transaction.

Sale of Gas Increased

Syracuse, N. Y.—The Syracuse Lighting Company, subsidiary of the United Gas Improvement Company, of Philadelphia, reports it sold 1,430,000,000 cu. ft. of gas in 1921, an increase of 10,000,000 cu. ft. over 1920. The company's sales of hydroelectric current last year amounted to 74,383,000 kw.-hr., against 115,656,647 in 1920, the decrease being due to the slowing down in activities at Syracuse manufacturing plants.

Suggests Zone Gas Rates

Newark, N. J.—It has been suggested by Chairman Treacy of the Public Utility Commission that two separate gas rates be evolved from the mass of testimony now before it in the gas rate reduction case, one for the Passaic division, the other for Hudson, Essex and Bergen Counties.

Differing conditions prevailing in the two groups are responsible for the suggestion, it was said. Should the rates, as they will be computed, be within a few cents of each other, one flat rate may be designated, but if there is much difference each will prevail in its own district, under Mr. Treacy's proposal.

Newtown Gas Rate $1.15

Brooklyn, N. Y.—The Public Service Commission has fixed a temporary rate of $1.15 a thousand cubic feet for the Newtown Gas Company. The company sought to increase the rate from $1.10 to $1.25 a thousand. The order of the commission provides that if it should be subsequently shown that a lower rate is justified, the company is to make refunds to customers.

Issues Additional Stock

Blackstone Valley Gas & Electric Company has issued on additional 22,000 shares of common stock, par $50, making total outstanding $3,465,000. The company has been paying dividends at the rate of 10 per cent on the par value of the stock and the present offering is made on a basis to yield about 7.70 per cent. For the twelve months ended Nov. 30, 1921, the company had gross earnings of $3,593,346; net after taxes, $1,173,641 and a balance after preferred dividends for reserves, replacements and common dividends of $759,260.

Oil News

The Transcontinental Oil Company, operating jointly with the Arkansas Natural Gas Company, has brought in two new wells in the southern extension of the Eldorado field, Arkansas. The wells came in, making 1,500 and 800 bbl. a day each, and are now flowing at the rate of 3,500 to 1,200 bbl. a day.

The Nickols No. 2, also known as Cosmos No. 2, on lot 17, Zacamixtle, has been brought in with a production of 15,000 bbl. Surface elevation was 2,242 ft. and subsea level 1,725 ft., seven feet deeper than Corona No. 30 on lot 16, which is showing no mulsion and making 26,000 bbl. It is three feet shallower than Corona No. 27, lot 17, which is the only other well in the Zacamixtle pool which has not gone to salt water.

To Erect New Water Gas Plant

The directors of the Fall River Gas Company, Fall River, Mass., have authorized the construction of a new water gas plant to be built on the site of the present coal gas plant at Charles and Bay Streets, Fall River, thus concentrating the manufacture of all the gas for the city of Fall River at one point. The new plant will cost $500,000.

Production and Distribution Costs Justify $1.25 Rate

The New York Gas Light Company, the Standard Gas Light Company, the New Amsterdam Gas Company and the East River Gas Company of Long Island City, filed affidavits with the Public Service Commission Jan. 20 in justification of the $1.25 rate which these companies have filed with the Public Service Commission, to take effect Feb. 11, superseding the $1.20 rate charged by these companies under the temporary injunction granted by the Federal court. These companies have just obtained final decrees in their rate suits in the United States district court, and the affidavits filed by the presidents of the respective companies explain that the $1.25 rate is slightly less than the companies are legally entitled to receive, as a matter of adequacy of return, but that the $1.25 rate is promulgated in the interests of uniformity with the $1.25 rate now being charged by the Consolidated Gas Company, the Central Union Gas Company and the Northern Union Gas Company, in the same territory in Manhattan and the Bronx.

The affidavits show the detailed costs of the production and distribution of gas as of Jan. 1, 1922, in comparison with the costs in 1919 and 1920, and show the present cost to be substantially higher than in those years. These actual costs for the four companies, including return on their actual investment at the rate found by the Federal Court are stated by the affidavits to be as follows:

	1919	1920	Jan.1,1922
New York Mutual Gas Light Co.....	$1.2938	$1.4694	$1.4012
Standard Gas Light Company.....	1.3581	1.4296	1.4526
New Amsterdam Gas Company.....	1.3075	1.3395	1.4132
East River Gas Company.....	1.3075	1.3395	1.4132

An affidavit contemporaneously filed by Robert A. Carter, vice-president of the Consolidated Gas Company, and in charge of the accounts and records of that company and the affiliated companies in Manhattan and the Bronx, shows the combined cost, as of Jan. 1, 1922, for all the companies, to be $1.3696, as contrasted with a rate of $1.25.

The affidavit of Mr. Carter shows that several items of costs, notably taxes, have increased in 1922 as compared with previous years. The increases in taxes assessed by public authority, which the companies are powerless to prevent, amount to several cents per thousand cubic feet of gas sold.

Mr. Carter's affidavit cites and quotes, in support of the reasonableness and necessity of these operating costs, the report just made to the Public Service Commission by the joint committee created by it last September, composed of representatives of the Merchants' Association and the manufacturers and other large users of gas, who sought to obtain from the company representatives reduced rates for gas. The Merchants' Association employed Edward J. Cheney, formerly chief of division of light, heat and power for the former Public Service Commission for the second district, to analyze the company's accounts and costs, and to disclose any errors or excesses therein.

Mr. Carter's affidavit states that the Consolidated Gas Company threw open its books, accounts, vouchers and records to the examination and verification of Mr. Cheney for the Merchants' Association, and the representatives of the industrial consumers desirous of obtaining the lowest rate for gas which the facts might warrant.

"The rates of pay of the company for labor," says Mr. Carter, "and the prices paid by it for coal, coke, gas oil and other materials were submitted to the scrutiny of the manufacturers and the representatives of other large industries, who were able to judge whether such prices for materials and wages for labor were in any respect excessive or unreasonable. Probably no better verification of the wages paid by the company and the prices paid by it for coal, oil and other materials could be had than the judgment and experience of the manufacturers and owners of other large industries, similarly employing labor and purchasing coal, etc., in New York City."

The joint committee created by the Public Service Commission unanimously reported to the commission, according to Mr. Carter, "that the quantities and prices of materials used, the percentage of gas lost in transmission, and the various expense items shown in the company's statements, are generally reasonable and in close accord with the known requirements of the gas industry. The wages paid by the company for labor and the prices paid by it for coal were found to be reasonable and moderate. No reason appeared for believing that the company buys gas oil or other gas-making materials on anything except an economical and advantageous basis of supply."

The joint committee created by the Public Service Commission also found unanimously, according to Mr. Carter's affidavit, that under the present twenty-two candle-power standard, the present prices for coal, oil and other materials, and the present rates of pay for labor, the "flat" rate required to meet operating expenses and yield a return of 8 per cent on actual investment would be $1.34 per thousand cubic feet of gas sold, and that the rate of $1.25 per thousand cubic feet now being charged by the Consolidated Gas Company under its tariff filed with the Public Service Commission, has proved inadequate to the extent of about 9 cents per thousand cubic feet, and has yielded a return only slightly in excess of 6 per cent per annum.

Gas Company Employees to Give Minstrel

Brooklyn, N. Y.—The minstrel show and revue which is being staged by the employees' association of the Kings County Lighting Company promises to be one of the best and most spectacular ever put on. The affair, which is to be held at Prospect Hall, Prospect Avenue near Fifth, on the evening of Jan. 31, will consist of acts by many well-known artists of the stage.

The end men will be composed of George Thornton, Jack Allen, Eddie Adams, William Morton, Arthur Biot, and Frank Arment. C. B. Ohnemuller will act as interlocutor.

Dancing will follow the performance.

Gas Bond Approved

The State Corporation Commission has approved bonds of the Muskogee Gas & Electric Company and the Oklahoma Gas & Electric Company which were required in connection with the recent temporary increase in gas rates granted the companies. The Muskogee company's bond was $5,000, while the Oklahoma City's bond was set at $15,000.

Gas Company Will Double Power Plant

Albany, N. Y.—Plans to more than double the electrical power output of the Municipal Gas Company electrical plant in Albany to meet the needs of industrial development are prepared and will become effective no later than next October.

The power output of the Municipal Gas Company, now 15,000 kw., is to be increased 17,000 kw., bringing it to a total of 32,000 kw.

A 156-ft. addition to the present plant of the Municipal Gas Company and the installation of a new turbine capable of generating the additional 17,000 kw. are details of the proposed development.

Announcement of this plan was first made at the Albany Chamber of Commerce industrial dinner, and has been officially authorized by Alexander Anderson, chief of the Municipal Gas Company's electrical department. In making the announcement Mr. Anderson pointed out that the present boiler room of the company will be large enough to house the new turbine, as this development was anticipated when the electric department of the gas company got its start fifteen years ago. Since that time the output has been increased from the small beginning of 1,200 kw. Mr. Anderson predicted that the time is not far off when Albany will need an electric power output of 150,000 kw.

"Albany is really an electric city—more so than Schenectady, if people knew it," said Mr. Anderson in emphasizing the fact that virtually all of the current produced by the gas company's electric department is generated by steam at certain times of the year.

Mr. Anderson at the industrial dinner outlined a plan for the industrial development of Albany which has attracted attention from stores of Albany business men, merchants and manufacturers. It calls for the linking up by railroads, water routes and State roads of the great industrial territory that would extend north and south from Ravena to Cohoes and west to the Mohawk River near Schenectady.

Not a Bank, but a Good Place to Leave Your Money

"As a soft answer may turn away wrath, so will a clever answer, given with a smile, sometimes make an unexpected sale," writes Robert Montgomery, manager of the Investment Department of the Louisville Gas & Electric Company.

"Since moving into our new quarters in the front of our office building, the marble, mahogany, brass railings, etc., give the place the atmosphere of a bank—at any rate, it was mistaken for a bank to-day by a gentleman who sauntered in and, approaching our stenographer, inquired, 'Is this the Fourth Street Bank?' 'No,' she replied, with a smile, 'But it is an awfully good place to leave your money,' and invited him to have a seat. He seated himself, apparently very much amused over his error, and allowed the young lady to elaborate on the excellent features of our preferred stock. He then explained that he had just arrived from Quincy, Ill., and had secured a position and wished to deposit or invest his savings, which he was carrying around in his inside pocket in the form of a large roll of greenbacks.

"He is now a shareholder."

Form Gas Range Company

Utica, N. Y.—Sales and show rooms of the Utica Gas Range Company, a new local concern, were opened Jan. 16 at 3 Blandina Street, under the active management of Harry M. Myers and Charles B. Cleary, members of the firm and organizers of the company.

Mr. Meyers has considerable experience in the gas appliance field, having been for nineteen years a special representative of the United Gas Improvement Company, of Philadelphia. He also was employed by the American Gas & Electrical Company and the J. G. White Management Corporation of New York City. Mr. Myers has been in Utica since last April as a representative of the Utica Gas & Appliance Company, resigning Dec. 31, to become a member of the new company.

Charles B. Cleary is a well-known resident of this city. For two years he was associated with the Utica Gas & Electric Company in the gas appliance department. He organized the local machine-gun company in 1917 and served as commanding officer of Company K, Tenth Infantry. The sales and show rooms have just undergone extensive remodeling to fit them up for the new concern. Not only will the usual household ranges and heaters be carried in stock but also the various types of stoves and ovens used by hotels, bakeries and candy manufacturers.

Our Natural Gas

Of natural gas we burn usefully in a year 800,000,000,000 cu. ft.—equivalent to the heating value of 40,000,000 tons of coal, and something like 8,000,000 families are directly benefited by it in cooking, heating and lighting. But the most significant aspect of this matter is that approximately two-thirds of the gas is used industrially. The history of our treatment of natural gas is a record of wanton waste. Just think of it: in the course of one month gas was allowed to escape unchecked from a well yielding the while 1,000,696,000 cu. ft. of the commodity; and in two months four wells scattered broadcast a total of more than 5,000,000,000 cu. ft. of gas! This dissipation of potential heat corresponded to 250,000 tons of coal, or enough to supply 50,000 households for a year. By recourse to moderate expense for proper casing at our gasoline wells an enormous conservation of this fuel might be effected.—*The Scientific American.*

$15,000,000 Is Held Pacific Gas Value

San Francisco, Cal. — General Manager John A. Britton of the Pacific Gas & Electric Company in a Railroad Commission hearing to determine the value of that system for rate-making purposes, placed the value at $15,000,000, exclusive of the physical properties and franchises. The valuation hearings have been in progress more than a year.

Britton asserted that the figure represented sacrifices made by the pioneers in the public utility field and a reward for efficient service.

When figured on the basis of an 8 per cent return on the properties ever since they were established, J. T. Ryan, valuation engineer of the company, placed the going concern value at $500,000 more.

"As this 8 per cent has not always been earned," he said, "the total return to the company had fallen $15,500,000 short."

Ryan testified that the cost to reproduce new the properties of the company increased from $31,708,566 in 1905 to $68,307,176 in 1919 and that the Pacific Gas & Electric Company had effected departmental additions and betterments from 1915 to 1919 to a total of $38,960,617, while additions to the electrical department capital of the company during the same period aggregated $28,653,980.